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FERTILITY BEHAVIOUR OF THE CHINESE IN CANADA

By

Zongli Tang ©

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fulfilment of the requirements for the degree of Doctor of Philosophy

in

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To My Mother

Abstract

This study concerns itself with the relevance of minority status, culture, immigration process, and other socioeconomic and demographic factors to the fertility behaviour of the Chinese in Canada. The focus of the work is on the importance of group context on the actions of individuals with respect to fertility. Contextual analysis and random coefficient models are the major statistical tools employed to achieve the above objectives. The Chinese-Canadians are compared to the British-Canadians who are used as the reference group.

The Chinese people in Canada consist of three subgroups: the native-born, adult immigrants (who entered Canada after their twenty first birthday), and child immigrants (who entered Canada before they were twenty years old). The results of this study suggest that discrimination, which varies by social class, is a crucial factor affecting native-born Chinese fertility negatively. Discrimination against the Chinese seems more severe at middle and upper class levels. The low fertility observed for well-educated Chinese relative to the British in the same class is mainly a function of economic insecurity caused by discrimination.

Pronatalist reproductive norms have a strong influence on the fertility behaviour of the Chinese in Canada. This influence effectively counteracts the negative effects of economic insecurity on Chinese immigrants and encourages them to quickly recover their fertility deficit after the initial stage of immigration. The effects of origin culture

on fertility diminish with increasing exposure to the host society. The findings of this study also show that even among the native-born Chinese, the influence of Chinese reproductive norms on fertility is still present, but it is not as strong as among the foreign-born Chinese.

Disruption associated with the immigration process plays a major role in depressing fertility of Chinese immigrants, especially adult immigrants. As child immigrants' reproduction is less likely disrupted by immigration, they bear more children than do adult immigrants.

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Chapter 1

Introduction

1.1 The Problem

Since the mid-1970s the Chinese have grown to be the largest visible minority group as well as the fastest growing immigrant group in Canada. According to the 1991 census, the Chinese constituted 2.2% of the total Canadian population and 7.6% of the total immigrants.[1] Thus, Chinese fertility can be an important component of Canada's overall level of reproduction. The present study attempts to explore the reproductive behaviour of the Chinese in Canada.

There were 586,645 Chinese-Canadians enumerated in the 1991 Canada census, consisting of two major groups: the native-born (or Canadian-born) and the foreign-born, which could be further separated into adult immigrants (who entered Canada after age 21) and child immigrants (who entered Canada before their twentieth birthday). The major purpose of this study is to examine: 1) the relationship between minority status and reproductive behaviour, 2) the relationship between immigration process and reproductive behaviour, with special reference to the Chinese, and 3) the cultural impact on Chinese reproductive behaviour.

Chinese reproductive behaviour is a product of the interaction of contextual factors at three levels, namely, social or national, community, and individual. There are two major types of variables at each level: structural or socioeconomic, and normative. Thereby, this study is based on multiple levels of analysis.

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[1] These figures are calculated based on Table 1A "Population by Ethnic Origin and Sex," and Table 2 "Immigrant Population by Place of Birth and Sex," in the 1991 Canada Census .

1.2 Minority-Status and Fertility

A dominant approach in the literature on minority group[2] fertility is the "characteristics hypothesis," which predicts that the distinctive fertility of a racial subgroup arises from the unique social, demographic, and economic attributes characterizing the minority group. Therefore, it is not race or ethnicity *per se*, rather it is these distinctive characteristics associated with race or ethnic membership that are thought to have causal import for explaining subgroup fertility. It may be deduced from this thesis that when the social, demographic, and economic characteristics of the minority and majority populations become more similar, either through statistical standardization, or at some time in the future, differences in fertility will disappear (Lee and Lee 1959). This explanation can also be coined as the assimilationist perspective (Jiobu and Marshall 1977), or structural approach (Halli 1990). Frisbie and Bean (1978) note that fertility differences depend on the extent to which the ethnic population has obtained access to or has been assimilated into the economic and political structures of the larger society.

---

[2] There are many definitions regarding minority group. Wirth (in Linton 1945:347)) defined minority group as "a group of people who, because of their physical or cultural characteristics, are singled out from the others in the society in which they live for differential and unequal treatment, and who therefore regard themselves as object of collective discrimination. The existence of a minority in a society implies the exitance of a corresponding dominant group with higher social status and greater privileges. Minority status carries with it the exclusion from full participation in the life of the society."
According to the United Nations Subcommission on Prevention and Protection of Minorities (1952), minorities are "those nondominant groups in a population which possess and wish to preserve stable ethnic, religious or linguistic traditions or characteristics markedly different from those of the rest of the population."

A major criticism of this hypothesis is provided by Goldscheider and Uhlenberg (1969). They argue that minority group status *per se* affects fertility independently of compositional differences between the minority and the majority. Their argument is based on a study regarding the fertility differentials of blacks and whites in the United States. When variables such as education or place of residence are controlled, the more highly educated blacks have lower fertility than highly educated whites, which contradicts expectations based on the characteristics thesis.

More explicitly, they hypothesize that minority group membership engenders social-psychological insecurities that serve to decrease fertility when:

1) the acculturation of minority group members occurs in conjunction with the desire for acculturation;
2) equalization of social and economic characteristics occurs, particularly in middle and upper social class levels, and/or there is a desire for social and economic mobility;

3) there is no pronatalist ideology associated with the minority group and no norms discouraging the use of efficient contraception (Goldscheider and Uhlenberg 1969: 272).

The attention gained by the minority-status hypothesis during the 1960s and 1970s inspired extensive investigations and commentaries regarding a variety of racial, ethnic, and religious contexts in various parts of the world (Sly 1970; Ritchey 1975; Kennedy 1973; Jiobu and Marshall 1977; Bean and Marcum 1978; Johnson 1979; Johnson and Nishida 1980; Trovato 1980).

Sly (1970) was the first to evaluate this hypothesis. He employed a three-way analysis of variance and found that when all the regions of the United States were considered, the minority status effect gained support. However, when the southern region was deleted from the analysis, he found that education, husband's occupation, and income appear to have the main effect on fertility. He interpreted this as support for the characteristics hypothesis.

Roberts and Lee (1974), using the same statistical methods as Sly, studied current and cumulative fertility among three classifications of minority status: White-non-White, Majority-Minority, and Spanish-other-Black ethnicity. Their study focused on the following: the definition of "ethnic group," the failure to control for the effects of age at marriage, and employment status of women in fertility analysis. Results from their analysis illustrated that for three separate categories of minority status - white-non-white, majority-minority, and Spanish-other-Black - the main effect of minority status on current fertility was stronger for the Spanish-other-Black group. This led to suggest that social-psychological factors should also be considered in subsequent research.

Richey (1975) investigated Black-White fertility differentials under situations of low, medium, and high levels of discrimination against Blacks. At higher education levels, the expected lower fertility among blacks in comparison to their white counterparts, is evident only in areas of high and low racial inequity. He suggested that the fertility of majority and minority groups converges concomitant to the assimilation of minority groups. Based on his context, it seems that the assimilation could be reached only after the discrimination against minority disappears. However, he did not state this point clearly in his paper.

Lopez and Sabagh (1978), using a sample of Los Angeles Chicanos, decomposed the minority status effect into structural and normative-cultural components. They found that well-educated Chicanos were more strongly associated with ethnic integration, and meanwhile, had lower fertility than poorly educated Chicanos. Therefore, subcultural values cannot explain why poorly educated Chicanos had high fertility. They argued that structural forces such as education and income provided the best explanation for high fertility among the lower class Chicanos.

In her analysis of the 1970 US data on Black and White Women, Johnson (1979) decomposed the variance in fertility into the interaction of race and education. Her findings did not support the thesis of Goldsheider and Uhlenberg (1969) that highly educated blacks would demonstrate lower fertility than highly educated whites. She concluded that the finding supported the weak form of the characteristics hypothesis, which posits that if the compositional factors are rendered similar for blacks and whites through social change, the most highly educated will be the first to depart from the childbearing pattern of the group as a whole.

Trovato and Burch (1982) analysed data from the Public Use Sample Tapes of the 1971 Canada census. They suggested that structural effect and subcultural effect, as introduced by Lopez and Sabagh, may be confounded in any empirically observed total effect of minority status on fertility. Moreover, the structural and subcultural effects may not, in many cases, be exclusive of each other. In reality, subcultural norms alone or in conjunction with insecurities may account for an ethnic effect on family size.

1.3 Immigration and Fertility

Migrants differ from non-migrants in terms of many demographic attributes and socio-economic characteristics. (Petersen 1972). They are not considered to be a random sample of their population of origin and are also bound to differ significantly from the receiving population due to selectivity.

The fertility of international migrants has been observed to differ from that of native-born women (Ebanks et al., 1975; Rosenwaike 1973; Rindfuss 1976; Balakrishnan et al., 1975; Bouvier and Gardner 1986; Blau 1992; Ford 1990; Stephen and Bean 1990; Kahn 1993). A review of the literature indicates that there are three major explanations for this.

According to the assimilationist hypothesis, fertility is influenced by both normative and socioeconomic systems in society. The fertility of immigrants, therefore, is affected by the fertility norms of their home country. It is postulated that if the area of origin of immigrants has higher fertility than the place of destination, then immigrants will tend to exhibit higher fertility than their non-migrant counterparts in the receiving country. On the other hand, if the area of origin has lower fertility, then immigrants tend to exhibit lower fertility in the host nation. The hypothesis predicts that the fertility of immigrants will undergo a change either upwards or downwards as they assimilate to the new socioeconomic environment and the norms of the country of destination.

Various terms have been used to describe this convergence process. Anthropologists use the term "acculturation" for the change of cultural patterns to those of the host society. While Park and Burgess (1921) called this process "accommodation," Hugh and Kallen (1974) used the concept "integration" to describe the convergence process. Gordon (1964) defined this process as "assimilation," and distinguished seven types of assimilation. The three most important types are: cultural or behavioural assimilation, marital assimilation, and structural assimilation. The convergence of fertility norms to those of the host society takes places at the structural and marital levels of assimilation. If a group remains isolated from the core group at the structural level, members of this group will continue to possess the fertility norms of the origin country.

A process of gradual acculturation to the fertility norms and values of the destination society is posited to occur from generation to generation. Consequently, one can expect the first generation to have fertility patterns very close to that of the country of origin while the second generation will be more similar to their native-born counterparts. The greater the length of exposure to norms and values of the host society, the more closely the fertility levels of foreign-born women will be to those of non-immigrant majority women (Bean et al 1984; Gurak 1980; Mitterbach and Moore 1968; Schoen and Cohen 1980; Blan 1992; Ford 1990; Kahn 1988; Swicegood et al 1988). Aggregate fertility differentials among immigrant groups may reflect the degree to which they have abandoned the "old world" norms and expectations of the origin society and adapted to those of the receiving country.

A second hypothesis in the literature is that of selectivity. Evidence in support of an assimilation explanation has been mixed at best. On the one hand, the level of fertility in the sending country has been shown to exert a strong positive influence on immigrant fertility behaviour, though the effect would weaken among immigrants as the length of residence of immigration continues (Kahn, 1988). On the other hand, contrary to expectations, many well-educated immigrants from some high fertility countries have had either equal or lower fertility than native-born women. The classical assimilation process from high to low fertility cannot possibly take place for these groups (Blan 1992; Ford 1990; Kahn 1988).

Ryder (1973) stated that it seems more realistic to assume that norms vary across subgroups, as defined either by subculture, social class, or some other criterion. This distinction is especially relevant to immigrants because they tend to be selected for characteristics that are associated with lower fertility such as higher education, stronger mobility aspirations, and better adaptability (Borjas 1985; Goldstein 1973; Harbison and Weishaar 1981; Hendershot 1976). Well-educated immigrants are less influenced by the high-fertility norms of their origin populations, and may already exhibit many of the same behaviours as members of the destination society, even before migrating. In this way, the degree of selectivity is hypothesized to moderate the impact of the sending country's norms (Kahn 1988). Therefore, the relatively low fertility of immigrants from countries such as China, India and Korea has been attributed to their high degree of selectivity, especially in terms of their socioeconomic characteristics. In other words, because of their high levels of education and income, they probably would have had lower fertility than their home country populations, even if they never had migrated (Kahn 1993).

A third perspective is the "disruption hypothesis," which holds that the process of migration interferes with fertility (Goldstein and Goldstein 1983). This interference may derive from seasonal factors (Massey and Mullan 1984), spousal separation (Goldstein and Piampiti 1973; Visaria 1969), or reduced fecundity owing to the pressure typically associated with moving to a new place or country (Hervitz 1985). The effects of disruption are posited to be temporary, occurring only for a short period of time. After the movement, the level of fertility may resume its previous pace, or even accelerate in order to compensate for the disruption. But even in the latter event, temporary disruption may be severe enough to reduce cumulative fertility (Stephen and Bean 1991).

Henripin's analysis (1972) of the 1961 Canada census data showed lower fertility among the foreign-born women considering four combinations. He examined fertility by country of birth of spouses and arrived at the following conclusion. When both the spouses were native-born, fertility was highest, whereas, if both were foreign-born, fertility was at its lowest. According to Henripin, fertility differentials among foreign-born women depends on the period during which they settled in Canada and on their age in the 1961 census. As the period of immigration got closer to 1961, the fertility of younger women decreased while the fertility of the older group increased.

Balakrishnan et al (1975) found that foreign-born women tend to have lower fertility. They believe that the causes for differentials are located in socioeconomic rather than in demographic characteristics. Sharma (1980), using data from the Growth of Alberta Families Study (GAFs), found that migrant women from high fertility areas had higher fertility than native-born women. However, the differentials in family size were not statistically significant.

1.4 Chinese Fertility in the U.S. and Canada

There have not been many systematic studies made on the fertility behaviour of Chinese immigrants. Most of the studies on Chinese fertility behaviour in North America have concentrated on the impact of minority status on fertility.

Goldscheider and Uhlenberg (1964) observed that the fertility of young Chinese-Americans was below that of native whites. They argued that it could be attributed at least partially to economic and political discrimination against Asian minorities in the process of acquiring high social status. They claimed, "when Chinese- Americans, particularly second and third generations, acculturate and are socially mobile, fertility levels will be lower than comparable socioeconomic status groups among native whites" (p.368). This statement has inspired some investigations involving the relationship between minority-status and Chinese fertility in North America. However, these studies have shown contradictory results.

Jiobu and Marshall (1977), using 1970 Public Use Sample for California and Hawaii, analysed the fertility of Filipino, Japanese and Chinese Americans. According to their study, while minority status does influence family size, the usual version of the hypothesis is not supported. For Chinese and Japanese, minority status tends to raise, rather than lower family size. They suggested that Chinese and Japanese may prefer larger families than do native whites, while Filipino Americans prefer smaller ones.

Johnson (1980) analysed the US 1970 census sample of Hawaii and California. The absence of any racial majority in Hawaii suggests that the minority-status hypothesis cannot explain racial differentials in fertility for that particular state. On the other hand, whites are a large majority in California, where there are also significant concentrations of Japanese and Chinese. Therefore, the population of Hawaii and California afford a natural experiment for testing the minority-status hypothesis. Johnson (1980) found that Japanese and Chinese wives in Hawaii had a higher average number of live births than did white wives. However, the Japanese and Chinese wives in California had slightly lower fertility than did the whites, providing support for a minority-status effect. According to the minority-status hypothesis, the desire for social and economic mobility, and at the same time, the existence of discrimination would force the Japanese and Chinese to reduce their fertility.

Halli (1987), using the data from the 1971 Canada census, analysed the fertility of Asian groups in Canada. In his regression decomposition model, the independent effect of minority status of the Chinese serves to reduce fertility by more than one child and such effect of minority status of the Japanese only reduces fertility by 0.4 of a child. He concluded that the minority group status hypothesis was strongly supported for the Chinese and moderately supported for the Japanese.

In the study made by Chui and Trovato (1988), cumulative fertility of Chinese and Portuguese minority groups in Canada were compared with that of the British. They attempted to test the minority-status hypothesis in the context of microeconomic effects. The data for their analysis were taken from the Public Use Sample Tape of the 1981 Canada census. The microeconomic theory posits a positive effect of income on fertility. Yet the minority status hypothesis suggests that this positive relationship between income and fertility will be confounded by the minority status insecurity effect. They hypothesized that as the Chinese people did not have a clearly defined pronatalist ideology, the effects of gains in socioeconomic status would serve to reduce their fertility. On the other hand, for the Portuguese, due to their Catholic pronatalist background, the effects of gains in economic variables such as income would serve to raise their average family size. The results of their study show that the effects of income are negative for both groups, but very small. They found that the Chinese had below average fertility in relation to the British. Based on the study, they suggest that if the Chinese assimilate the socioeconomic characteristics of the British, their fertility would increase substantially. However, their minority status insecurities would override this effect and would actually afford them a small overall decline in fertility.

1.5 Chinese Traditional Culture and Reproductive Behaviour

For the minority-status hypothesis, according to Goldscheider and Uhlenberg (1969:268), one precondition is that "there is no pronatalist ideology associated with the minority group and no norms discouraging the use of efficient contraceptives." Thus, the studies on Chinese fertility in North America all assume that the Chinese people do not possess a particular pronatalist culture. In actuality, however, Confucian doctrines and Chinese ancestor worship do contribute to pronatalism among the Chinese.

In fact, many western sociologists, demographers and anthropologists have observed that Confucianism has had a strong influence on Chinese reproductive behaviour (Kuo 1984; Cleland, Verral and Vassen 1983; Coale 1984; Coombs and Sun 1981; Freedman and Coombs 1974; Stacey 1983; Williamson 1976; Croll 1985; Banister 1987; Lorimer 1958). Confucianism and classic Chinese philosophy have strong principles of "reproduction worship." This may be explored from the point of view of Confucian ontology.

I Ching (The Book of Changes), which was thought to be written in the Zhou Dynasty (841-476 B.C.), is the chief source of Confucian cosmology. The whole book is based on a symbol, peculiar to Chinese orthography, known as the *ba-gua*. In ordinary usage, the unbroken lines "-" are styled *yang* and the broken lines "--" are styled *yin*. The meaning of *yin* and *yang* has ontological significance. According to Ge Muru (1982:468), "-" symbolizes man's reproductive organ and "--" symbolizes woman's reproductive organ. He said, "It reflects the survival of ancient `reproduction worship'."

Ba-gua consists of eight basic trigrams: *qian, kun, zhen, xun, kan, li, gen, dui*; symbolizing eight natural phenomena. Except for *qian* and *kun*, all trigrams consist of both broken and unbroken lines. *Qian* consists only of unbroken lines and *kun* consists only of broken lines. Thereby, *qian* also means man and *kun* means women. Among the eight trigrams, *qian* and *kun* are considered to be the most important ones, which create all the things in the universe. (Tang 1995)

Because of the importance of *yin* and *yang* in Confucianism, *sheng* (reproduction) became part of the lofty realm of classic Chinese philosophy. *Yin* and *yang* are the two basic factors that make up *sheng*. Everything consists of these two factors and is a result of the movement towards unity of the two opposites. In other words, sexual relations are the driving power of changes in the universe. If reproduction stops, nothing on the earth would exist any longer. Zhou Yutong (1983:69) pointed out, "It is not only the Confucian world view that is based on the thought of *yin* and *yang*, but also all Confucian fundamental ideas that start from the `reproduction worship'. In a sense, Confucianism is a philosophy of reproduction." The philosophical idea of "reproduction as the fountainhead of a flourishing and prosperous world" has helped to formulate Chinese reproductive behaviour.

Confucianism is not a religion but rather a philosophy. If Chinese people have any native religion, this religion is considered to be a form of ancestor worship (Soothill 1951). Before the founding of communist China, nearly every Chinese family had an ancestral altar where offerings were made at regular intervals. For the major rites, especially on the Chinese New Year Eve, all the members of the family would assemble and demonstrate obedience to their ancestors. Clan temples to ancestors were found in every village which consisted of members of a clan with the same surname.

Ancestor worship is the cornerstone of the Chinese patriarchal family system (Ebrey 1991). Schwarts (1985) describes "the orientation to ancestor worship" as "centre to the entire development of Chinese civilization." This type of worship was also found in many primitive and agrarian societies. What makes the Chinese case unique is that Confucianism provided ancestor worship with a rational explanation. This then evolved into a religion with philosophical contents from a primitive totem. This is one reason that ancestor worship has gone on for several thousand years in China. Ancestor worship became the spiritual pillar of the Chinese patriarchal society which has continued in existence until today.

Ancestor worship is a reverence for the reproductive process because it expresses heartfelt thanks for the ancestor's contribution to the life-giving process (Tang 1995). It is compatible with the Confucian cosmology of *yin* and *yang*. In the classic Chinese book *Li Chi* (Ritual Texts), Confucians or his disciples state that, "As everything originates from the heaven and earth, so the people are reproduced by their ancestors. The contribution made by ancestors is parallel to the heaven and earth." Thus, the ancestors' position in Chinese society is similar to that of a deity.

Xiao (filial piety) means to show filial obedience to parents. It has been the most important moral criterion for the Chinese people. In Hegel's words, "China is based on a unity of morals, the essence of the country is filial piety in the family. " (quoted from Lian 1989:119)

According to Mencius, a founder of Confucianism and second only to Confucius, filial piety has three implications: to support and wait upon parents, to respect parents, and to reproduce posterity to continue parent's lineage. The last is considered to be most important. Mencius asserts that, "there are three crimes against filial piety, to leave no posterity is the worst." (*Menzhi*) As a consequence, the significance of filial piety is based on continuity of the parent's life, which means not only carrying on the parent's physical life but also perpetuating their spiritual life or undertakings. This explains why the Chinese stress both quantity and quality of children. The former is necessary for the continuation of the family, while the latter, which is mainly displayed in children's education, is necessary to bring honour to the ancestors. Good education means prestigious social status in the future. For most of the Chinese, the two are the goals of life.

In a patriarchal society, it is the son who is entitled to keep the family name. Thus, ancestor worship and filial piety were turned into son preference in reproductive behaviour. In pre-modern societies, risk of death was very high. The people were forced to have a large number of children in order to guarantee at least one male child, who could survive to adulthood. Thus, the son preference became "the more the children, the better the fortune," which formulated traditional Chinese reproductive norms.

Universal marriage is another characteristic of Chinese pronatalist culture. Marriage is given special prominence in Confucianism because it is required by filial piety, namely, the continuity of posterity. In addition, it also serves for control of sexual desire. Within marriage, the emphasis is placed on reproductive significance, the interpersonal relationship between husband and wife, rather than sexual significance, that is, the relations between man and woman.

In summary, ancestor worship is the religious factor behind son preference while son preference characterizes Chinese pronatalist norms. Confucianism provided son preference with a philosophical and ethical explanation and turned it into a moral code.

Son preference has played a key role in promoting Chinese fertility. In the early 1970s, Freedman and Coombs (1974) organized and coordinated a project of studying sex preference among developing and developed countries. According to their reports, Taiwan and Korea belonged to the group with strong son preference. The mean number of sons preferred for Taiwan is 2.1 and the mean number of the desired 3.9. This was not only higher than those for investigated European countries and the United Sates, but also higher than those for most investigated developing countries such as India, Korea and Thailand. Son preference is directly related to the desire for a large family size. In general, at least four children are needed to have two sons on average.

Studies have reported that filial piety and son preference still have a strong influence on Chinese life and reproductive behaviour (Huang 1982, Arnold and Liu 1986, Freedman 1986, Cooney and Li 1994). This influence would certainly exert some impact among the Chinese in North America. According to an estimation made by Basavarajappa and Halli (1984), the Chinese in Canada had attained the second highest fertility among all Canadian ethnic groups until 1961. Furthermore, based on the data from the 1971 Canada census, Chinese women aged 19-49, who could be regarded as the parental generation of Chinese women at the same ages in the 1991 census, possessed a higher fertility rate than British-

Canadians at the average as well as at almost every education level. Therefore, the assumption that the Chinese in North America have no pronatalist ideology does not hold true.

How are we then to explain the fact that fertility in the Chinese world, including mainland China, Hong Kong and Taiwan, has declined dramatically since the 1970s? In Hong Kong and Taiwan, the current total fertility rate has even dropped to below replacement. A convenient explanation for this may be modernization. The government's intervention and family planning program have also played an important role in reducing fertility. But, are there any cultural events leading to this?

As mentioned before, the key point of ancestor worship and filial piety is the continuity of the family. For Chinese families pronatalist reproduction is not a goal but a means to guarantee at least one son that will survive to adulthood. The progress made in health and the decrease of mortality has made it unnecessary to bear many children just to achieve the goal of continuing the family. Moreover, continuity of the family has two aspects: physicality and spirit. Chinese families all stress the education of children in order to achieve the second goal. Education is negatively related to fertility. Therefore, traditional Chinese culture is not a serious obstacle to the process of Chinese demographic transition. However, as Freedman (1986) pointed out, son preference in the Chinese world would continue to be strong, but a smaller number of sons and children now satisfies this preference. The desire for at least one son would prevent Chinese fertility from further decline and would keep it at a certain level. For instance, the Chinese world as a whole still remained at a higher fertility than most developed countries in the 1980s.

Hiller (1956:127) states that, "In every civilization births are, according to experience, contributed by the persons who have acquired the prevailing culture and who have been conditioned by the stimuli arising in society." He concludes that a general population theory must rest upon cultural premises. In a multi-ethnic society, ethnic fertility differentials, to some degree, could be explained by cultural distinctions.

1.6 Outline of the thesis

This dissertation is organized in eight chapters. The first chapter presents a critical review of the previous theoretical and empirical research on minority-status, immigration, Chinese pronatalist culture, and fertility.

The second chapter describes the general theoretical framework, the data, and methodology utilized in this dissertation.

The third chapter discusses the fertility behaviour of the native-born Chinese. The emphasis is put on the effects of minority-status on Chinese fertility.

The fourth chapter discusses the fertility behaviour of Chinese immigrants to Canada, intending to examine the relationship between fertility and such factors as assimilation and disruption caused by the immigration process.

Chinese cultural or normative influence on the fertility behaviour of the native-born Chinese and immigrants will be examined in Chapter 5.

Compared to the native-born Chinese, the foreign-born Chinese fertility behaviour is affected by more factors. The compound effects of the factors discussed in previous chapters will be examined in Chapter 6.

The seventh chapter makes a comparison among the three subgroups (i.e., native-born Chinese, child immigrants, and adult immigrants). It consists of cross-tabulation analysis and multilevel regression analysis.

A summary of the findings, conclusions drawn and directions for further research in this area are presented in Chapter 8.

Chapter 2

Research Strategy

In this chapter, we will discuss the general theoretical framework, statistical techniques, data, and structure of the dissertation.

2.1 General Theoretical Framework

In the theoretical framework (see Figure 2-1), individual fertility behaviour is affected by socioeconomic determinants at three levels: national level (society), group level, and individual level. Group level could mean ethnic groups (or communities), social classes, and immigrant-status groups (i.e., foreign-born and native-born).

At each level the determinants could be grouped into two main blocks: structural factors (i.e., socioeconomic variables) and normative factors (i.e., cultural influence). National-level determinants such as norms of the mainstream culture may in some cases affect individual reproductive behaviour directly, but in most situations they only exert indirect influence through determinants at group levels.

Although fertility in a country is determined by both socioeconomic development and cultural environment, ethnic fertility differentials within a society can be treated as a reflection of cultural differences among groups. In this study, the British-Canadians are taken as the reference group of the majority in Canada. British group fertility is considered for this thesis to be the index of the mainstream culture of Canadian society. Chinese group fertility is regarded as the normative variable at group levels. In the sense that the Chinese in Canada are a minority group and suffer from various discriminations at society and class level, the class relative economic status (RES) of Chinese husbands, which measures the discrimination within a given class, is chosen as structural factor at the social class level.

In Figure 2-1, unbroken lines represent correlational relations and broken lines represent causal relations. Eventually, variables among the three levels affect each other. On the one hand, as the arrows show, national variables affect group variables, which then affect individual level variables. On the other hand, individual level variables affect community variables, which then affect national level variables. For the convenience of presentation, we do not mark such direction of the correlations.

Fishbein (1972) proposed a model to describe individual reproductive behaviour. His model is:

$$BI=\left(\sum_{1}^{n} B_i A_i\right)w_1+\left(\sum_{1}^{n} NB_i MC_i\right)w_2 \qquad 2.1$$

where,

BI: Behavioural intention to perform an act (i.e., to have a child)

B_i: Belief that performance of the act will lead to some consequence

A_i: Value of performing the act to the individual

NB_i: Perception of how acceptable the act is to the reference group

MC_i: Individual's motivation to comply with his/her reference groups' norms about an act

w_1 and w_2 are empirical weights of the components in the equation.

This model could be revised as the following, according to the framework in Figure 2-1.

$$RB = w_1 N_i S_i + w_2 \left(\sum_{1}^{n} N_i S_i\right) + w_3 \left(\sum_{1}^{m} \sum_{1}^{n} N_{ij} S_{ij}\right) \qquad 2.2$$

where,

RB: Individual reproductive behaviour (i.e., to have a child);

N_i: Individual values for children of the ith person;

S_i: Individual structural variables or socioeconomic characteristics of the ith person;

N_{ij}: Individual values for children of the ith person in the jth ethnic group;

S_{ij}: Individual structural variables or socioeconomic characteristics of the ith person in the jth ethnic group;

w_1, w_2 and w_3: Empirical weights of the variables;

n: Numbers of individuals

m: Numbers of ethnic groups

Of the right part of the equation, the first component represents variables at the individual level, the second component represents variables at the group level or the aggregation of the individual level variables within a given group, and the third component represents variables at the societal level or the aggregation of the individual level variables within a given society. Each level consists of both normative and structural (or socioeconomic) factors. As Figure 2-1 shows, the normative variable at the national level will be operationalized as British fertility, the structural variable at the class level will be operationalized as discrimination against the Chinese, the normative variable at the social class level will be operationalized as Chinese community fertility, and structural variables at the individual level will be operationalized as individual income, education, occupation, labour force activities, and so on. Structural variable at the national level will not be considered because our fucus of this study is put on discrimination against minority at class level . Normative variable at the individual level will not be considered either due to lack of data.

Table 2-1 lists all the variables and their definitions that we will use in this study.

2.2 Statistical Methods

Since this research involves the analysis of variables at several levels, contextual analysis is an appropriate statistical technique.

Individual behaviour is affected not only by individual attributes but also by the social environment. The study of a individual's behaviour reflects the interaction between people and their environment. Contextual analysis is the study of the role of the group or social context on actions and attitudes of individuals (Iversen 1991).

Durkheim (1897) maintained that social interaction and social relationship influenced individual attributes, ideas and behaviour. Kendall and Lazarfeld (1950) are said to be the first sociologists to do contextual analysis using the mean score of individual variables as group variables. Scheuch (1969) stated that contextual analysis was now used primarily for an analysis that reflected global properties to individual attributes. Przeworski and Teune (1970) suggested that in any system where the dependent variable linearly depended on the independent variables, the slope of the linear regression lines may differ from system to system. In this case, the context operates in an interactive manner, that is, in such a way that it either systematically increases or decreases when the group mean for the independent variables increases.

Van den Eeden and Huttner (1982), while introducing applications of multi-level research, concluded that many social problems had to do with the fact that society was built up of different layers. They further stated that these layers could be studied in multi-level research models.

In contextual analysis, there are two types of community or group level variables. One type is called "structural," meaning that measurements can be made only from community or group characteristics, not from individuals. The other type of community variable is called "aggregate," meaning that measurements are based on the aggregation of individual characteristics. Both types of community-level factors are sometimes called "contextual" variables (Hong 1979). It is only the "structural" variables that are germane to this study. By doing so, we could avoid such issues as inter-correlation between two levels variables (or among various levels variables).

When variables from different levels are analysed at one single common level, it becomes an important problem to identify the proper level to which all variables must be aggregated or disaggregated for the statistical analysis. Also, if the researcher is not very careful in the interpretation of the results, a danger exists of committing the fallacy of analysing the data at one level and making inferences to another (higher or lower) level. This fallacy is known as the "ecological fallacy." Robinson (1950) describes the mathematical relation between ecological (i.e., aggregate) and individual correlations and concludes that both are almost certainly not equal, either in magnitude or in sign.

The discussion about inferential fallacies has given way after 1980 to a discussion about the appropriate procedure to investigate cross-level hypotheses, or multilevel problems (Iversen 1991).

In the past, traditional ordinary least squares (OLS) models are usually applied to the analyses of multilevel data, disaggregating all high level explanatory variables to the lowest level. By doing so, it is believed according to Hox and Kreft (1994) that the following multilevel problems could appear.

Dependency. Observations within a group that are close in time and/or space are expected to be more similar than observations in different groups. The amount of covariation between the scores of observations sharing the same context can be expressed by the intraclass correlation (Hays 1973). When ordinary significance tests are used, treating the individual as the unit of analysis, the important assumption of independence of residual error terms is violated. Even small values of the intraclass correlation have been shown to lead to Type 1 errors that are much larger than the nominal alpha level.

Random effects. An effect in ANOVA is said to be fixed when inferences are to be made only about the treatments actually included. An effect is random when the treatment groups are sampled from a population of treatment groups and inferences are to be made to the population of which these treatments are a sample. Random effects of this type need random effects ANOVA models (Hays 1973). Multilevel models assume a hierarchically structured population, with random sampling of both groups and individuals within groups. Consequently, multilevel analysis models must incorporate random effects.

Cross-level interactions. Cross-level interactions are interactions between explanatory variables defined at different levels of the hierarchy. An important subclass of the multilevel problem is the question of how several individual and group variables jointly influence one individual outcome variable. Analysing cross-level interactions requires that variables defined at different levels of the hierarchy are combined in a single statistical model. However, disaggregating all higher level variables and performing a single-level analysis implies unacceptable simplifications, leading to inefficient parameter estimates and downwardly biased precision estimates.

According to Iverson (1991), multilevel model could be given by the following equation:

$$Y_{ij}=\alpha_0+\alpha_1 x_{ij}+\alpha_2 \bar{x}_j+\xi_{ij} \qquad 2.3$$

or Y_{ij} = original value + individual effect + group effect + residual effect

This equation is a fixed model. The group level variable in this model is considered the average or aggregation of the individual values. Obviously, it does not take the "structural" variables at group level and random effects into account.

In a fixed effects multilevel regression model, the micro-level coefficient is expressed as an exact function of macro-level variables. Random effects multilevel models, in contrast, contain error terms in the macro equations. The use of random coefficient models allows the data analyst to decompose the variance in the dependent variable into the within-context variance and the between context variance, and to study these two sources of variance for the micro-level outcome. Thus, random coefficient multilevel (RC) models are a type of variance components model and will be used in this study.

Suppose we have P explanatory variables X_{pij} ($p = 1, \ldots P$) at the micro-level, and Q explanatory variables G_{qj} ($q = 1, \ldots Q$) at the macro-level, following the approach of Mason, Wong, and Entwisle (1984), the micro equation is given by

$$Y_{ij}=\beta_{0j}+\beta_{pj}X_{pij}+\xi_{ij} \qquad 2.4$$

where Y is the micro dependent variable, X is the micro regressor (independent variable), $j = 1, \ldots J$ denotes contexts and $i = 1, \ldots n_j$ denotes micro observations within contexts. The intercept β_{0j} and the slopes β_{pj} are treated as random variables at the macro level that can be modelled by the macro variable G_{qj}. Then we obtain the macro part of the model:

$$\beta_{0j}=\eta_{00}+\eta_{0q}G_{qj}+\alpha_{0j} \qquad 2.5$$

$$\beta_{pj}=\eta_{p0}+\eta_{pq}G_{qj}+\alpha_{pj} \qquad 2.6$$

where G is the macro regressor. Equations 2.5 and 2.6 represent the effects of contextual characteristics G_{qj} on the two parameters of the micro model. We

acquire a single equation expression for the multilevel model by substituting Equation 2.5 and 2.6 into Equation 2.4:

$$Y_{ij}=\eta_{00}+\eta_{0q}G_{qj}+\eta_{p0}X_{pij}+\eta_{pq}X_{pij}G_{qj}+(\alpha_{0j}+X_{pij}\alpha_{pj}+\xi_{ij}) \qquad 2.7$$

This model is a mixed model, containing fixed coefficients (the η's) and random coefficients (the α's). The basic difference between the random coefficient model shown in Equation 2.7 and the fixed coefficient model concerns the error structure shown in Equation 2.5 and 2.6. The fixed effects models assume these errors are zero. The coefficients of the fixed model can be estimated by using OLS.

2.3 Data

We use data from the individual files of the Public Use Sample Tape (PUST) of the 1971 and 1991 Canada censuses. The unit of analysis is currently married females aged 15-49 of Chinese or British ethnicity. Age distribution for both British and Chinese groups in the PUST of the 1991 Canada census is shown in Table 2-2.

It would be better to use infants who were born in 1990 as the fertility measure since most of socioeconomic data in the 1991 census are the current characteristics of the enumerated people. However, it is impossible to acquire

current fertility data from the 1991 Canada census. As an alternative, the number of children ever born is used as a proxy.

This study is concerned with the influence of Chinese husbands' economic status on their wives' fertility behaviour. Data on husbands' socioeconomic variables and wives' variables can only be found in the family file of the PUST. But, unfortunately, this file does not contain explicit information on the Chinese (as they are lumped with "other ethnicities"). Therefore, we use data from the individual file and assume that married Chinese males are husbands of married Chinese females in the same file. Strictly speaking, some of these assumed "linked' couples are not in actuality married. However, since this study focuses on the role of group context (i.e., husband class economic security) on individual behaviour, this assumption is not very problematic. In order to eliminate interracial marriage, only respondents who married a Chinese person are considered in this study. Since generally the age difference between wives and husbands is about two years (husbands being older), married males aged 17-51 are included in this study to complement the females aged 15-49. Furthermore, in the case of the Chinese, it is commonly held that traditionally, Chinese women should not marry men who are less educated than they (Cheung 1988; Leete 1994). In fact, we found from the family file in the 1980 Canada census that 67.3% of Chinese women were married to men with the same education and 28.2% of them were married to men with higher education. Under the circumstances, we assume that Chinese wives have the same education as their husbands, and therefore being in the same social class as their husbands.

Chapter 3

Minority Status and Fertility of the Native-Born Chinese

This chapter focuses on minority status effects on the fertility behaviour of the native-born Chinese. We intend to meet three objectives: 1) to find a direct indicator to measure the degree of discrimination and economic security, 2) to explore the relationship between discrimination and Chinese fertility behaviour at the social class level, and 3) to relate the influence of economic insecurity to explanation of the fertility behaviour of the Chinese across social classes.

3.1 Problems in previous studies

As mentioned in Chapter 1, although the minority status hypothesis inspired extensive tests between the 1970s and the 1980s, this hypothesis has not received overwhelming support in the literature. A number of factors may contribute to this.

First, researchers have not used direct indicators to measure insecurity caused by discrimination. In order to distinguish the function of insecurity from socioeconomic characteristics, Goldscheider and Uhlenberg stressed the importance of social-psychological mechanisms. They argued that well-educated minority members experience insecurity psychologically and that the desire for social and economic mobility induces them to work hard and to reduce their child bearing. Since insecurity is considered a psychological variable, it is very difficult to operationalize.

Second, previous studies have focused on either the aggregate or the individual levels of analysis, and have paid less attention to comparative analysis at the social class level, which is the level between society and individuals. An absence of such analysis would result in ambiguous conclusions. For instance, a fertility similarity between a minority group and a majority group at the aggregate level may conceal significant fertility differentials between the two groups at the social class level. In addition, most studies have failed to realize that discrimination against minority members varies across social strata. Thus the degree of discrimination experienced by minority members varies by one's social class, and this would affect fertility behaviour differentially among minority members in different classes.

Third, Goldscheider and Uhlenberg (1969) claimed that the minority-status thesis best applies to minority members within the middle and upper classes. They argued that, for the poorly educated minority members, the desire for upward mobility (which makes the psychological insecurity active) is not as strong as among minority members in the middle and upper classes. Accordingly, minority-status or "insecurities" effects related to discrimination cannot be assumed to apply in the explanation of fertility behaviour among lower class members. This view may in fact be too limiting.

Johnson (1979) suggested that the higher fertility of less educated blacks might be explained wholly by their disadvantageous social, demographic, and economic characteristics. However, this thesis is less applicable to explaining why minority members in the lower class possess higher fertility than majority members in the lower class with the same socioeconomic characteristics.

Perhaps this situation can be best explained by normative influences, as suggested by Roberts and Lee (1974), Frisbie and Bean (1978), and Gurak (1977). That is to say, poorly educated minority members may have higher fertility than their majority counterparts because they are strongly influenced by the group's pronatalist norms when the minority group as a whole possesses an identifiable pronatalist culture. Yet, according to Goldscheider and Uhlenberg (1969), minority groups having a pronatalist ideology are not considered as subject to the minority-status and "insecurities" effects. In such cases high income would likely encourage rather than depress the fertility of minority members in middle and upper classes.

If well-educated minority members are thought to have assimilated structurally to the majority (and are therefore less likely affected by pronatalist culture), then, according to the characteristics hypothesis, their fertility should be close to the level of the majority in the same social class. However, as has been observed, there remain notable fertility differentials between groups at the middle and upper class levels. Therefore, a consistent theory to explain the fertility behaviour of a minority group across social classes is necessary.

3.2 Class Discrimination and Husband's Relative Economic Status

Discrimination is not only attitude, but, more importantly, an action. William (1947:39) said, "Discrimination may be said to exist to the degree that individuals of a given group who are otherwise formally qualified are not treated in confirmity with these normally universal institutionalized codes." Therefore, discrimination brings minorities not only psychological feeling but also physical consequences, which could be best explained as economic insecurity. Economic insecurity is a measurable variable. Based on this premise, we use relative economic status (RES) to measure degrees of economic security or insecurity among the Chinese in Canada in relation to the British. RES is the ratio of annual income per schooling year of minority members divided by the same value of majority members.[3] As wage could reflect the extent of discrimination more accurately than income could, in this study wage is employed in the estimation of RES. If the RES ratio is more than unity, the Chinese have relatively better economic status than the British, and therefore greater economic security. If the ratio is less than unity, the Chinese have a relatively inferior economic status, which means less economic security (or stated differently economic insecurity compared to the British). This ratio could be calculated for individuals, social classes, and communities to determine individual economic security, class economic security, and community economic security respectively,[4] presenting degrees of discrimination at the three levels. Since this study focuses on the effects of group context on individual fertility behaviour, RES at social class level or class economic security is used.

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[3] annual income per schooling year = annual income / schooling years

With regard to attained socioeconomic status, education might be one area where minorities would perhaps experience the least discrimination. However, equalization of education levels would not necessarily offer minority members the same job opportunities. It was observed that Blacks' occupational chances in the United States were consistently inferior to whites (Siegel 1965; Blau and Duncan 1967; Blau 1987; Gill 1993). According to the National Longitudinal Survey of Young Men (NLS), for these individuals who stated that they desired to work in Managerial Sales and Clerical, and Craft Occupations, blacks were significantly less likely than whites to end up working in these occupations, controlling for such factors as education and training background.

Even if minority members are offered the same job as majority, there still exist pay differentials. Blau and Duncan (1967) noted that the occupational status of both the Japanese and the Chinese was higher than that of the whites, but the income level of whites was nevertheless the highest of all ethnic groups. They believed that it must be attributed to ethnic status itself and probably to the discrimination. Minority members are more likely assimilated into the educational institutions than into the institutional income (Sly 1970). Therefore, income especially wage differentials at the same education level may be viewed as a an objective indicator of degree of injustice against the minority.

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[4] Individual RES (in society) = individual wage per schooling year of the minority / community mean of annual wage per schooling year of the majority.

Individual RES (in specific class) = individual wage per schooling year of the minority / class mean of annual wage per schooling year of the majority.

Class RES = class mean of annual wage per schooling year of the minority / class mean of annual wage per schooling year of the majority.

Community RES = community mean of annual wage per schooling year of the minority / community mean of annual wage per schooling year of the majority .

Economic insecurity may be reduced by female labour force activity. If a minority husband has inferior RES, his wife would probably work to supplement family income and thus maintain living standards compatible with their social status, which is operationalized by the husband's education. The average living standard within a specific social class is usually modelled on the consumption level and pattern of the majority group. A high level of wife's labour force participation would, all things equal, reduce child bearing. In this sense, it could be proposed that husband's RES is a principle factor in shaping a household's family size.

In this chapter, we intend to examine the relationship between discrimination against Chinese males at given social classes (i.e., education levels) and Chinese fertility behaviour under the hypothesis that the higher the husbands' RES, the higher the fertility at both social class and individual levels of analysis. That is, if Chinese husbands at a given social class have favourable RES, their wives would reduce their labour force activity, thus increasing fertility and *vice-versa.*

White-non-white income differentials in the United States increase with increasing education. The largest income differential between whites and non-whites was observed for men with some college (Siegel 1965; Blau and Duncan 1967). Thus discrimination against minorities is probably more severe in middle and upper classes than in low classes. Therefore, we hypothesize that the lower the education level of Chinese husbands, the less severe the discrimination and thus the greater the relative degree of economic security for Chinese families at a given class. In such a context, there is less necessity for Chinese wives to work hard, thereby, the fertility of the Chinese relative to that of the British at a given class will be higher. By contrast, the higher the education level of husbands, the more severe the discrimination and thus the lower the husbands' relative economic security at a given class. Correspondingly, there is greater necessity for Chinese wives to work hard, and therefore the fertility of the Chinese relative to that of the British at a given class will be lower.

As mentioned in Chapter 2, the data from the Public Use Sample Tape (PUST) of the 1991 Canada census are utilized in this study. The unit of analysis in this chapter is native-born currently married women aged 15-49 of Chinese or British ethnicity. It would be better to use the number of infants born in 1990 as the fertility measure since most of socioeconomic data in the 1991 census are current characteristics of the enumerated people. For the reason mentioned above, this study employs the number of children ever born as the fertility variable.

A major issue in studies conducted in the past regarding minority-status is that immigration effects were not separated from other fertility determinants. This is perhaps one reason why there appeared contradictory findings in previous research concerning Chinese fertility in North America. Some studies employed intercept difference in the minority/majority regression decomposition equation(Jiobu and Marshall 1977; Halli 1987) to explain the role of minority-status in Chinese fertility behaviour. As immigrants make up a large percentage of the Chinese living in North America, the intercepts could be affected by various factors in immigration process, and therefore, cannot be regarded as pure functions of minority status. Johnson (1980) realized this and restricted her analysis to native-born Chinese. However, her sample size was only 39 cases in Hawaii and 81 in California. These numbers may be too small to provide convincing conclusions. Choosing the native-born Chinese excludes the possible confounding influence of immigration. In this study the sample size of native-born Chinese married women is 354 cases.

3.3 Descriptive Overview

In Figure 3-1, there are five educational levels: elementary school, junior high school, high school, university (undergraduate studies including bachelor degree), and master degree and beyond. Native-born Chinese married males aged 17-51 and females aged 15-49 have much higher percentage with university and higher degrees than the British of the same age category. In Figure 3-2, occupation is classified as four categories: skill I (manual jobs), skill II (clerical workers and semi-skilled manual workers), skill III (semi-professionals, supervisors, and senior clerical workers), and skill IV (managers and professionals). Chinese males and females are more concentrated than the British in the categories of Skill III and IV. These comparisons indicate that the native-born Chinese are highly integrated into the educational and occupational structures of Canadian society. In fact, they surpass the British on these variables.

Table 3-1 describes Chinese husbands' RES by education and occupation, which, as mentioned above, is a measure of economic insecurity caused by discrimination. Chinese husbands have inferior actual RES at three educational levels (high school, university, and master degree plus) but favourable RES at two educational levels (elementary and junior high school). The higher the education, the lower the Chinese husband RES. A similar trend appears in Chinese husbands' RES at four occupation categories. The higher the occupational class, the lower the RES. These figures state clearly that discrimination against the Chinese is more severe at middle and upper classes than at lower classes.

The amount of wages could be possibly affected by working experience.

We did not find significant change in this variable as compared with the actual RES after standardizing Chinese husbands' RES on length of working experience (age minus numbers of years in school). Hence, we will continue to use the actual or unadjusted RES in the latter analysis.

Table 3-2 shows a comparison of number of weeks worked in 1991 and labour force participation rates between Chinese and British wives. The ratios of Chinese wives' weeks worked and labour force participation rate relative to the British go upward while their husbands' relative economic status (RES) goes downward. The higher the Chinese wives' education level, the more the weeks worked as well as the higher the labour force participation rate compared to British wives. This is consistent with the expectations that Chinese husbands' RES or economic security would have bearing on their wives' labour force activity.

If we extend the comparison to all women, non-married Chinese women aged 15-49 present a different picture. Table 3-3 indicates that non-married Chinese women at most education levels work less and have lower labour force participation rate than their British counterparts. It could be that non-married Chinese women do not experience the pressure from men's economic insecurity and do not need to work as much as married Chinese women do. It therefore further supports our previous argument that married Chinese women work hard because of the pressure resulted from their husbands' inferior RES. They have to keep the living standards compatible with their family social status.

Table 3-4 shows the fertility of Chinese and British wives (i.e., the number of children-ever-born). Chinese fertility at three education levels including high school, university, and master degree beyond, is lower than that of the British. At junior high school level, the Chinese have higher fertility.

Figure 3-3 summarizes the relationship between Chinese husbands' RES at given classes (as shown in Column 1 in Table 3-1) and Chinese class fertility behaviour which is operationalized as the ratio of Chinese fertility relative to the British (as shown in Column 3 in Table 3-4). The ratio of Chinese wives' relative fertility follows the trend of Chinese husbands' class RES or the index of economic security. This supports our hypothesis that Chinese husbands' economic security has positive impact on their wives' child bearing. In other words, discrimination against the Chinese in a given social class negatively affects Chinese class fertility. From the figure we can see that the two curves do not overlap and that there is a gap between the two curves, which reflects effects of other variables. For instance, psychological feeling of insecurity and desire for upward mobility may shift the curve of relative fertility further downward at middle and upper class levels. Traditional pronatalist norms combined with relative economic security may cause a positive vertical translation effect to the curve of relative fertility at lower classes. From this figure, we can also observe that the negative gap between Chinese husbands' RES and wives' relative fertility rate become wider with the increasing education. It may reflect the elasticity of response to RES. Well-educated native-born Chinese families are highly sensitive to their relative economic status. Economic insecurity would change their fertility more significantly than the relatively poor-educated families.

3.4 Multi-level Analysis

Multi-level or contextual analysis is applied to examining the impact of discrimination against the Chinese at a specific class level on Chinese individual fertility behaviour. We hypothesize that a Chinese wife's child bearing is affected not only by her individual social, economic, and demographic characteristics, but also by the socioeconomic environment. That is to say, it is affected by discrimination against her husband in the given social class. Chinese husband RES at a given class is regarded as a macro-level variable.

RC model is utilized in the contextual analysis. A fundamental assumption of RC model, as mentioned in Chapter 2, is that elements at both group and individual levels are randomly sampled. Some scholars have considered social classes as fixed categories. In this study, however, social classes as well as immigrant groups are assumed randomly sampled because the classes are categorized on the randomly selected elements. Therefore, classes in this study are still a sample of classes in population.

To make a comparison with multi-level analysis, we first use an ordinary least square regression model (OLS) to test the effects of individual level variables on Chinese wives' fertility behaviour. The regression equation is given by

$$Y_i=\beta_0+\beta_j x_{ij}+\xi_i \qquad 3.1$$

where Y_i is the dependent variable CEB (children-ever-born by married Chinese females aged 15-49), X_{ij} represents j independent variables of woman i, β_0 the intercept, β_j coefficients, and ξ_i the error term. We have five independent variables at the individual level, including age, income (annual wage), labour force participation (EMP: in labour force = 1, not in labour force = 0), weeks worked in 1990 (WEEKS), and education (EDU, total years of schooling[5]).

Generally, women would have more children with increasing age during their reproductive span. We expect that age will have positive effect on CEB. It is hypothesized that income would negatively affect women's fertility behaviour because, under most situations, behind high income, there are usually more

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[5] The education variable in the 1991 Canada census file was coded in terms of broad categories of completed years of education. In this study the midpoints were calculated:

Census Coding	Midpoints
no schooling	0.0
grades 1-4	2.5
grades 5-8	6.5
grade 9	9.0
grade 10	10.0
grade 11	11.0
grade 12	12.0
grade 13	13.0
university 1-4 years	15.5
university plus	20.5

working time or more schooling years, which would reduce fertility. Labour force activity will also negatively affect CEB. Chinese women who participated in labour force would possibly bear fewer children than those not in labour force. Meanwhile, Chinese women who worked more time will also possibly have fewer children than those worked less time, assuming that these women had held this working pattern by the census time. Finally, we expect that there will be a negative relationship between schooling years and CEB.

The multivariate regression coefficients are given in Table 3-5. Signs of the coefficients are consistent with our expectations. All independent variables are statistically significant except for employment (EMP).

We now switch to the random-coefficient model (RC) to execute the contextual analysis. Following the approach adopted by Hox (1994) in his research, we first examine the micro-level-only model, which contains explanatory variables at individual level as fixed variables. We assume that $X_{pij}\alpha_{pj}$ is zero. Equation 2.7 simplifies to:

$$Y_{ij}=\eta_{00}+\eta_{p0}X_{pij}+(\alpha_{0j}+\xi_{ij}) \qquad 3.2$$

(terms defined earlier).

The RC model omits EMP which was not significant in OLS model. The program MLn[6] is employed in the computation. The parameter estimates, constant, and two variance estimates, σ^2_ε for the residual variance at the class level, and σ^2_υ for constant variance at individual level, are summarized in Table 3-6.

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[6] MLn is a multilevel modelling program developed by the Institute of Education, University of London.

The signs of these parameter estimates are the same as those in the OLS model and all the estimates are statistically significant at 5% level.

The next step involves the addition of the class variable (i.e., macro-level variable G_{qj}), Chinese husbands' RES at five education levels, to this model, giving the following equation (terms defined earlier):

$$Y_{ij}=\eta_{00}+\eta_{0q}G_{qj}+\eta_{p0}X_{pij}+(\alpha_{0j}+\xi_{ij}) \qquad 3.3$$

The parameter estimates, constant, and variances are summarized in Table 3-6. Standard errors are listed in Appendix A. Since Chinese husband's RES is a "structural" variable at class level, there would be no such possibility as the issue of inter-correlation between class level variables and individual level variables.

The subsequent model is Equation 2.7, which is a complete single equation of RC model and includes interaction terms of micro (individual) variables and macro (class) variables. In this study the only significant interaction term is that of weeks worked with the class RES variable. Therefore, we only show this term (WEEKSRES) in Table 3-6.

The comparison of the variances across the different models and model deviances based on the chi-square test show the fit of the different models (Hox

1994). From Table 6 we can see that the values of σ^2_ε and σ^2_υ reduce from one model to the next, thus, both the individual and class variables explain a significant portion of the initial variance in children ever born. Moreover, the more terms in the model, the smaller the values of the deviance. Hence, the more complete models provide a better fit.

After adding the class variable to the model, we discover that Chinese husbands' RES has positive effect on children ever born. That is to say, if discrimination against Chinese husbands at a specific class level reduces, Chinese husbands would feel more secure economically and their wives would have more children. The sign of the interaction term involving WEEKS (which could be regarded as the indicator of women's labour force activity during the year of census) and RES indicates that improved economic security within a given class level would change the negative effect of Chinese wives' working on fertility shown at the individual level. This point can be further explored in Table 3-7, which displays the partial derivatives of wives weeks worked on children ever born conditional on husbands' RES level. This table illustrates that the negative effect of Chinese wives' working on children ever born becomes weaker when Chinese husband relative economic status becomes increasingly better. This result could be explained from two perspectives. First, as we hypothesized previously, Chinese wives would probably reduce their labour force activity and consequently increase their child-bearing when their husbands have higher level of economic security. Second, Chinese wives in higher social classes may feel more pressure than those at lower classes due to their husbands' lower RES. If the former work the same time as the latter, the former would have fewer children.

3.5 Discussion

The descriptive statistical analysis shows that the native-born Canadian-Chinese have been well integrated educationally and occupationally to the majority group represented by British-Canadians, but they have not achieved the same economic status as the British. We hypothesized that this is a function of discrimination, for Chinese husbands' relative economic status deteriorates with increasing education. The most severe discrimination occurs at the highest education levels, suggesting that the door leading to the ruling class and managerial stratum for the Chinese is not open widely.

As indicated in most previous studies of minority-status and fertility, we observed that at low levels of education the Chinese have higher fertility than the British and that at high levels of education Chinese fertility is below that of the British. Correspondingly, we found that as the relative economic status of Chinese husbands rises, the fertility of Chinese wives relative to the British also rises, and vice versa.

The Chinese people in Canada are a minority group with a relatively high fertility culture. Their fertility behaviour is affected by both minority status (i.e., discrimination) and pronatalist ideology (compared to the mainstream culture). To illustrate the effects caused by the two conflicting functions, we introduce the concepts of economic security in society and economic security in specific social classes.

Discrimination against minority operates at both society and social class levels. The two types of discrimination would separately affect a minority male member's income relative to the average earned by the majority in society as well as his income relative to the average earned by the majority in a given socioeconomic group with which he is identified. This would determine the minority member's economic security in society and also his economic security within a class. In general, a minority member's economic status is limited by his education. That is to say, he will not be able to pursue the economic status beyond his education and he will neither be satisfied with the economic status which cannot provide him with the same average living standard as the whites in his social class characterized by education. Therefore, for a minority family, the husband's relative economic status or the index of economic security (or insecurity) in his social class may be of more significance than his relative economic status in society. Consequently, in affecting a minority individual's reproductive behaviour, discrimination in a given social class plays a more important role than discrimination in society under the given income.

It seems that discrimination against the Chinese is less severe at low classes than at middle and upper classes. On the one hand, a poorly educated Chinese man may feel secure economically in his class despite his inferior economic status in society. Thus, in this context, the traditional Chinese pronatalist ideology would serve to enhance child-bearing. On the other hand, a well-educated Chinese man may feel insecure economically in his social class even though his economic status is relatively favourable in society. In this situation, his pronatalist orientation would be overridden by economic security consideration, his wife would likely increase her labour force activity, and fertility would therefore decline. However, it does not mean that pronatalist ideology has less influence on the middle and upper classes than on the low classes; this means that economic insecurity would weaken Chinese normative influence. Our contextual analysis denotes that if discrimination is reduced and economic security improved, the Chinese people would probably increase their family size regardless of the level of education due to the inherently pronatalist culture.

We may conclude from this analysis that economic security (or insecurity) within a given class combined with normative influence could be a critical factor in affecting class fertility differentials between the Chinese and the British in Canada. As long as discrimination against a minority does not disappear altogether, the group will not be able to entirely achieve the same income as the majority group, and therefore, will not feel secure economically, even if they are successfully assimilated educationally and occupationally. Under such circumstances, ethnic fertility differentials will not necessarily disappear. From this point of view, this study affords support to both the minority status and characteristics hypotheses under the circumstances that education, occupation, and income are all considered socioeconomic characteristics while income is strongly affected by minority status.

Chapter 4

Immigration and Chinese Fertility Behaviour

This chapter is intended to examine how immigration process affects Chinese fertility behaviour. We will focus our interests on disruption, assimilation, and the "insecurities" effects mentioned in Chapter 1.

4.1 Research Methods and Hypotheses

Chinese immigrants are divided into two subgroups: adult immigrants and child immigrants. Adult immigrants are those who entered Canada after age 21, while child immigrants are those who entered Canada before their twentieth birthday (Kahn 1986). Since most of the child immigrants did not reach marriage age before their arrival and would have most likely completed their final education in Canada, the effects of disruption and assimilation on fertility behaviour of this group would be different from the adult immigrants. In comparison to adult immigrants, the child immigrant group would probably better assimilate to the majority, thus, increasing their chance for economic advancement.

Disruption effects are posited to be temporary (Ford, 1990; Hervitz, 1985). These effects would be expected to be most evident in generational comparisons involving the current fertility of younger immigrants who have arrived more recently (Stephen, 1987). Since it is impossible to acquire current fertility data from the 1991 Canada census, we can only utilize cumulative fertility (children-ever-born) to test this hypothesis. Disruption effects mainly affect the fertility behaviour of adult immigrants and would continue to be evident in cumulative fertility. Therefore, we hypothesize that younger adult immigrants (aged 20-29) have the lowest rate of children-ever-born among the three Chinese subgroups (i.e., native-born, child and adult immigrants) due to the function of disruption.

Chinese female immigrants, under the influence of high fertility norms, would speed their child bearing after a period of arriving in Canada in order to compensate for the loss caused by disruption. In other words, in the long term, immigration process would not dramatically disrupt Chinese female immigrants' child bearing. Obviously, without waiting until all potential mothers have aged out of their childbearing span, we would not know exactly how many children they would have had. This number could be estimated by the children-ever-born by Chinese female immigrants aged 45-49 in this study. We hypothesize that there is no dramatic difference in the number of children-ever-born among Chinese women aged 45-49 in the adult immigrant group regardless of their arriving years.

The assimilation hypothesis assumes that fertility convergence occurs sometime after migration takes place. A process of gradual acculturation to the fertility norms and values of the destination society is posited to occur from generation to generation. As such, the greater the length of exposure to the host society, the more closely the fertility levels of the immigration groups will come to approximate those of nonimmigrant majority women. (Bean et al., 1984; Gurak 1980; Mittelback and Movre 1968; Schoen and Cohen 1980). Chinese immigrants mainly came from three areas: mainland China, Hong Kong and Taiwan. The Chinese in the three areas possessed more children-ever-born on an average than Canadians before 1991 (this will be discussed in detail later). Since the native-born Chinese, in comparison to the foreign-born Chinese, have resided in Canada longer, and hence, have been more assimilated to the low fertility culture of the receiving society, we predict: 1) the number of children-ever-born among the foreign-born Chinese women will be higher than that among native-born Chinese-origin women, 2) the number of children-ever-born among Chinese adult immigrant women will be higher than that among Chinese child immigrant women, and 3) the number of children-ever-born among Chinese adult immigrant women with short immigration period will be higher than that among Chinese adult immigrant women with longer immigration period. The dates of years of immigration in the 1991 census are used to measure the degree of assimilation for the two immigrant groups. The more the years since immigration, the longer the length of exposure to Canadian society.

Previous studies have paid more attention to the effects of disruption and assimilation, and as such have ignored "insecurities" effects on the fertility behaviour of minority immigrants. This particular issue will also be discussed in this chapter. The index of RES continues to be used as the indicator of Chinese husbands' economic insecurity. We assume again that Chinese wives are in the same social class as their husbands and that their individual fertility behaviour is under the contextual influence of their husbands' RES within a given class.

Compared to their native-born compatriots, the foreign-born Chinese suffer not only discrimination but also hardships in job hunting and job assessment as manifested by immigration issues such as language and so on. Their economic status relative to the majority would be worse than the native-born counterparts. This would probably result in a further reduction in the fertility among the foreign-born Chinese. Taking into account economic insecurity effects, we hypothesize that Chinese adult immigrants would have lower fertility than child immigrants, and that Chinese immigrants as a whole would have lower fertility than their native-born counterparts. According to the assimilation hypothesis, we predicted that the native-born Chinese would have fewer children than the foreign-born Chinese. Therefore, consequences generated by insecurity effects would then contradict what the assimilation hypothesis predicts.

4.2 "Insecurities" and Fertility

Tables 4-1 and 4-2 show the education and occupation of the three Chinese groups and the British in Canada. In the area of education, Chinese immigrants are unable to match the achievement made by their native-born counterparts. But when compared to the British, Chinese immigrants still possess a higher percentage of university degrees (including M.A. plus). Chinese immigrants are also more concentrated in the category of professional jobs (skill IV and skill III) than the British. However, these immigrants, especially female immigrants are not so successful in their careers as their native-born counterparts.

Table 4-3 displays that immigrant husbands' RES at almost every category is worse than the native-born Chinese. According to our calculation, the average annual wage reported in the 1991 census is $33126 for native-born Chinese husbands, $30347 for child immigrant husbands, and only $25815 for adult immigrant husbands. It seems that based on our calculation, as compared with the native-born Chinese, immigration consequences are not so financially beneficial to immigrants especially to the adult immigrant group.

Reference period for income/wages reported in the 1991 Canada census is the calendar year 1990 and not 1991. Immigrants who arrived in 1990 would not have full 12 months to earn income in Canada and those who arrived in 1991 would have no earnings in Canada, thereby resulting in underestimation of incomes. In the 1991 Canada census, however, the year of immigration refers to the year in which landed immigrant status was first obtained in Canada. It is impossible for most immigrants to obtain their landed immigrant status immediately after their arriving. Therefore, income for immigrants, who obtained their landed immigrant status in 1990, would be less likely underestimated. Immigrants, who obtained their landed immigrant status in 1991 and would be most likely underestimated their income, only accounted for 3% of the total Chinese immigrants. After they are removed from the sample, the average annual wage is $30240 for child immigrants and $27260 for adult immigrants. Adult immigrants are still the lowest income group among the Chinese-Canadians.

RES for Chinese immigrant husbands as classified by education does not exactly follow the pattern we discussed in Chapter 3. For instance, Chinese husbands with junior and high school education in the child immigrant group and with high school education in the adult immigrant group have worse RES than those better-educated. It could be that the poorly educated Chinese immigrants have more difficulties integrating into the destination society than those who possess a higher education. Under the circumstances, RES for immigrants is a compound of discrimination, assimilation, and disruption.

We use Figures 4-1 and 4-2 to illustrate the interaction between immigrant husbands' RES and their wives' fertility relative to the British (as shown in columns 4 and 6 in Table 4-4). For child immigrants, the ratio of Chinese wives' relative fertility basically follows the trend of Chinese husbands' class RES. Yet, we did not find a similar relationship existing in adult immigrants. In Figure 3.3, the curve of native-born wives' relative fertility is lower than the curve of husbands' RES at most classes. We postulated that it reflects effects of other variables. Psychological feeling of insecurity and desire for upward mobility may drive down the fertility curve. However, in Figure 4.1, child immigrant wives' fertility curve is higher than the RES curve at most classes except for the class with the M.A and higher degrees. In Figure 4.2, adult immigrant wives' fertility curve is higher than the RES curve at all classes. It could also reflect effects of other variables. For instance, Chinese cultural influence may shift the immigrant fertility curves upward.

RES score for adult immigrants at most educational and occupational categories is the lowest among the three groups. Correspondingly, under the "insecurities" hypothesis, they would have the fewest children-ever-born. However, as shown by Table 4-4, their actual CEB number at the average is the largest among the three groups. When standardized with British age groups, adult immigrants' average number is still larger than the native-born Chinese. This shows that "insecurities" effects alone cannot explain Chinese immigrants' fertility behaviour.

4.3 Disruption and Fertility

Table 4-6 shows Chinese children-ever-born of the three groups by age. We found that the number of children-ever-born for adult immigrants at two youngest categories (20-24 and 25-29) is the smallest among the three groups. This is consistent with our previous hypothesis that due to temporary effects of disruption, younger adult immigrants would have the lowest fertility among the Chinese in Canada.

The number of children ever born by women aged 45-49 is considered to be completed fertility. Chinese female adult immigrants aged 45-49 are separated into four groups according to the year when they obtained the landed immigrant status (see Table 4-7). Those who were authorized the immigrant status between 1966-1971 and were at the age of 20-25 are categorized to the first group. Their fertility behaviour would be most likely disturbed by disruption function during the initial period of immigration. Group 4 represents these who obtained the immigrant status between 1986 and 1991 and were 40-44 years old during that period. Since these Chinese immigrants would have probably finished their reproduction before they entered Canada, their fertility would not be affected by disruption function. When compared to Group 1, Groups 2 and 3 were less likely to be affected by disruption because they were in their middle-age when they entered Canada. Under the disruption hypothesis, the number of children-ever-born for Group 1 would be the smallest while the number for Group 4 would be the largest. It was observed that the lowest rate does exist in the first group, reflecting the impact of disruption. However, the highest rate was not observed in Group 4.

We found that disparities among the four groups, especially the difference between the first and the fourth groups is not significant. Moreover, despite the negative impact of disruption, the completed fertility of the first group is significantly higher than the fertility of the native-born Chinese within the same age group. This indicates that these immigrants probably speeded their child-bearing after they passed over the early stage of immigration.

4.4 Assimilation, Disruption, and Fertility

Tables 4-4, 4-5, and 4-6 have shown that the native-born Chinese have the smallest average number of children-ever-born, thus providing support to the assimilation hypothesis. On an equal basis, child immigrants would have lower fertility than adult immigrants. From the three tables, however, we can see that the age specific CEB rate and the adjusted average rate for child immigrants are higher than those for adult immigrants, indicating that the results do not lend support to the assimilation hypothesis. Since the descriptive analysis did not clearly reveal the role that assimilation plays in Chinese immigrants' fertility behaviour, ordinary least square-model (OLS) is applied to the further exploration. The unit of analysis in this model is Chinese married women aged 20-49 within the two immigrant groups. The dependent variable is the number of children-ever-born to Chinese married women. The independent variables are socioeconomic characteristics of these females. These include age (AGE), occupation (dummy variables, OCC01: Skill IV (professional jobs) = 1, others=0;

OCC02: skills III (semi-professional jobs) = 1 others=0; OCC03: skill II (skilled jobs) = 1, others=0), education (EDU, schooling years), labour force status (EMP,dummy variable, in labour force =1, not in labour force=0), employment status (FPT, dummy variable, full time job=1, part time job=0), and annual wage (WAGE). Another independent variable is the assimilation process, which is operationalized as the number of immigration years. According to our calculation, the average immigration years for child immigrants and adult immigrants are 18.4 years and 8.4 years respectively. Based on the assimilation hypothesis, we hypothesize that the variable "immigration years" would negatively affect the fertility behaviour of Chinese immigrants.

The OLS equation is given by:

$$Y_i=\beta_0+\beta_j X_{ij}+\xi_i \tag{4.1}$$

(terms defined previously).

The multivariate regression coefficients are provided in Table 4-8. As OCC02 is highly inter-correlated with the other two occupation variables (see Appendix A), we do not include this variable in final results.

We found that socioeconomic variables demonstrate the same dimensions as we have observed previously. Contrary to our prediction, the variable "immigration years" (or immigration duration) shows that the number of Chinese children-ever-born increases rather than decreases with the increasing immigration years. From another point of view, the variable "immigration years" could be understood as the indicator for the role of disruption, which would be weakened with the prolonged period of residence in Canada. Hence, the positive correlation of immigrations duration with CEB may demonstrate the diminishing effects of disruption.

4.5 Conclusion

Descriptive statistical analysis of Chinese immigrant fertility supports the disruption hypothesis which states that disruption temporarily depresses the potential for child bearing among the immigrants, but, after a short period, these immigrants would speed up their child bearing.

On the assumption that a gradual acculturation to the reproductive norms of the destination society occurs from generation to generation, the native-born Chinese would bear fewer children than the foreign-born Chinese, while the child immigrants would have lower fertility than adult immigrants. The assimilation hypothesis seems partly justified by native-born Chinese fertility behaviour. Yet, it cannot explain why Chinese child immigrants, who had longer lengths of exposure to the destination society, raised more children than adult immigrants. Furthermore, the assimilation hypothesis was not supported by the OLS analysis. Instead, the results exhibited a positive relationship between Chinese immigrants' fertility and immigration years. As adult immigrants' fertility behaviour is more likely to be disturbed by the immigration process, their lower fertility rate, as compared with child immigrants, could be attributed to the role of disruption. Thus, the positive relationship between CEB and immigration years may indeed reflect the fact that Chinese immigrants speed their child bearing after a certain period of residence in Canada, hence presenting the diminishing effects of disruption.

Economic insecurity (or RES) for immigrants is not a simple function of discrimination, but instead, it is a combination of discrimination with immigration process effects (such as low skills of official language). "Insecurities" effects might be used as a factor to interpret that child immigrants have higher fertility than adult immigrants. This is based on the fact that the former have better RES than the latter. However, it did not provide an answer as to why the native-born Chinese, whose RES is significantly higher than the immigrant groups, have lower fertility than the immigrants. Because the various hypotheses often operate in a conflicting way, it is difficult for separate empirical testing to explain the complex fertility behaviour of Chinese immigrants. A comprehensive analysis will be undertaken in Chapter 6.

Chapter 5

Cultural Norms and Fertility

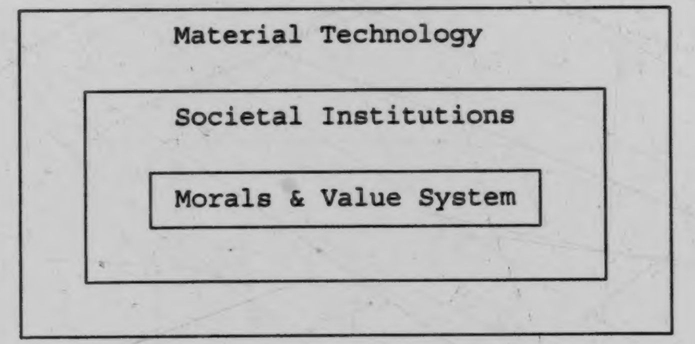
In previous chapters, our concern focused mainly on the impacts of structural factors such as discrimination and immigration on Chinese fertility behaviour. In this chapter, we shift the focus to normative factors, exploring the effects of the cultural context particularly reproductive norms on Chinese individual actors. The unit of analysis is all married women aged 20-49 in the three Chinese subgroups.

5.1 Definition of Culture

The reproduction of human beings is a highly culturally determined affair. According to Hammel (1990), culture may explain why the population of a geographic region or an ethnic group continues to behave demographically in much the same way over time even though economic and demographic conditions change.

Culture could be defined in various ways. Yin Haiguan (1988), a Chinese anthropologist, divided culture in a broad sense into three levels as indicated in the following figure.

Figure 5.1 Culture in Broad Sense I

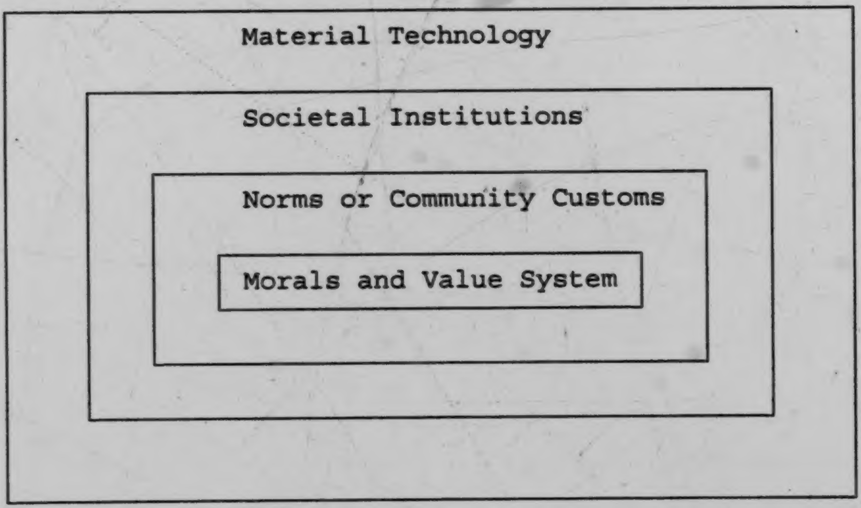


The outer level is represented by material technology and is most likely to change over time. The middle level represents the institutions and the organizational structure of the society, which encompass social, political and economic aspects. In comparison to the outer level, this level is not as easy to change as material technology. The inner level represents the morals and the value system, or ideological system, which happens to be the core of the culture in a society. This level is even less likely to be modified or altered over time.

Based on the above framework, culture in a broad sense refers to the form of both material and spiritual treasures as created by human beings in society. In a narrow sense, culture relates to the ideology of the society. In this study, culture will be used in a narrow sense, as represented by the morals and value system of a society.

Yin's typology could be expanded to include another level that is situated between societal institutions and the value system. This level is represented by the norms or the community customs as indicated in Figure 5-2.

Figure 5.2 Culture in Broad Sense II


Material Technology
Societal Institutions
Norms or Community Customs
Morals and Value System

The norms or the community customs then act like a bridge across the ideological values and people's actions. It concretizes the society's abstract principles of morals and values into detailed criteria, providing guidance into people's daily life.

Within a society, changes often take place first in the outer level, the material technology, and is then transmitted to the level of societal institutions. Technological changes further penetrate into the norms or community customs, and finally trickles down to the inner level, the morals and value system. It is also the outer level that first experiences changes generated by external influence. From this outer level, the external influence gradually penetrates into inner levels. The morals and the value system would be the last level to be influenced. The invariable characteristics of this sort are termed cultural duality. (Caldwell 1987).

Unlike the value system, the norms or the community customs alter periodically with socioeconomic development. In most situations, changes that take place in this level do not necessarily indicate an essential cultural or value change. On the one hand, norms in a given period reflect social and economic mutations at that time. On the other hand, norm may remain consistent with a society's values. This type of development distinguishes these norms from those in another society (or another ethnic group) even though the two societies (or the two ethnic groups) are in the same socioeconomic stage. Meanwhile, a society or an ethnic group in different socioeconomic stages would have different norms guided by the same values.

For instance, a central family value that exists in Chinese traditional culture as indicated by the need to "having sons to continue generations and clans," has remained resistant to any type of changes or external influence. However, "family size," a reproductive norm that has developed from this value, has evolved in several varieties. In agrarian China, the miserable subsistence and poor health conditions forced the people to bear many children in order to ensure that at least one son would survive to adulthood. Thus, "a large size of family" became a reproductive norm at that time. With the improvement made in material technology and medical care system, "a large family" was no longer a necessity. Yet, the need to have a son still services the purpose of continuity of clans and generations. Hence, the norm has changed, but the value system remains intact. Based on the above discussion, reproductive norms, which reflect both society's values and socioeconomic changes, will be the major concern in this part of the study.

5.2 Chinese Fertility Pattern and Reproductive Norms

In a multi-ethnic society, a minority member's fertility behaviour is influenced both by the mainstream culture and his/her own subculture. In some studies, questions like "home language" or "knowledge of official language" were employed to distinguish the two types of influence or to illustrate structural assimilation and acculturation. A problem, however, exists in this measurement whereby language, as a carrier of culture, is not related to any form of reproductive ideology. The term "language" does not demonstrate any normative dimensions regarding family size, sex ratio, marriage and so on.

For certain ethnic groups, high fertility is believed to be associated with their religious doctrines. Degrees of religious orthodoxy have been found to be positively related with Catholic fertility. (Day 1968; Gibborns 1949; Noonah 1965;

John 1960; Salloway 1969). It has led researchers to view "religious orientation" as the representation of specific normative characteristics of reproduction. This method, however, is not applicable to the study of Chinese culture. As mentioned in Chapter one, Confucianism, the major ideological guidance of Chinese reproductive behaviour, cannot be considered a religion. For this reason, most Chinese do not identify themselves with any religion. In addition, in answering such categorical questions as "language" and "religious orientation", dichotomous responses are frequently employed. The answers like "yes" or "no" cannot effectively measure slight cultural distinctions, especially people's various attitudes towards family size. A failure of a refined measurement has made the empirical analyses of cultural influence on Chinese reproductive behaviour extremely lacking in the literature.

In this study, fertility pattern or the average number of children-ever-born in a given period for countries and ethnic groups is employed as the indicator of cultural influence and reproductive norms.

A commonly accepted thesis is that fertility is determined by both socioeconomic development and cultural environment. The economic school even asserts that fertility can be taken to be primarily economically motivated. A question then arises related to the use of fertility pattern: To what extent does the average period fertility demonstrate reproductive norms? It will be argued here that socioeconomic development influences man's reproductive behaviour in a collective context through reproductive norms.

As mentioned above, socioeconomic changes occur frequently. The changes, however, do not always immediately alter people's behaviour over society. Initially, a few pioneers may respond to certain changes. In some situations, their conductive innovations would diffuse gradually to others. Many changes in society, after all, are the result of the diffusion of innovations (Rogers, 1995). Nevertheless, until new norms take their shape, people's behaviour would not change drastically over society. In this sense, fertility behaviour in a collective context is more directly influenced by reproductive norms than by socioeconomic development.

We have stressed the term "collective context" because the fertility pattern or the average period fertility in a society (or in an ethnic group) is the product of collective behaviour. An imperative goal of this study concerns how group context affects fertility decisions of individuals. Individuals act somewhat differently from collectives. In fertility decision making, individuals are often subject to various pressures such as financial conditions, time considerations, and so on, and are thus unable to behave accordingly to the expectations of reproductive norms. Under these circumstances, individual fertility behaviour is frequently distorted. However, most of these non-normative factors in people's collective behaviour would counteract one another. Thus, the collective reproductive behaviour could follow the path as directed by reproductive norms.

In other words, group fertility or national average fertility would more likely reflect normative influence than individual fertility output.

Reproductive norms usually manifest themselves through community customs, which embody themselves in a relatively long period of fertility trend. Starting from this point, cumulative fertility would be superior over the current rate in measuring the trend. In this study, the number of children-ever-born by age group is treated as the fertility pattern and thus the indicator of reproductive norms regarding family size.

Chinese fertility behaviour in Canada is under the influence of the mainstream culture and their own subculture. British fertility (children-ever-born to women by age group) in the 1991 census is considered to be the indicator of mainstream reproductive norms. Yet, choosing the indicator of Chinese reproductive norms is somewhat complicated. Normative influence on fertility behaviour is shaped in different ways for the three Chinese subgroups. The native-born Chinese are influenced by their community norms or customs mainly through what they constantly see and hear from their parents. Under this assumption, parental fertility, operationalized as the fertility of a cohort 20 years older than the current generation, is utilized as the indicator of community norms. This synthetic cohort could be obtained from 1971 census data of Chinese women aged 20-49, who are treated as the parent generation of Chinese women in the same age range (i.e., 20-49) in the 1991 census.

We have conceptualized adult immigrants as those who entered Canada after their early twenties. By the time a woman reaches adulthood she would already have been socialized according to certain norms and attitudes regarding child bearing (Ryder 1973). Hence, normative influence on Chinese adult female immigrants comes from their home country.

Most Chinese immigrants originated from three areas: mainland China, Taiwan and Hong Kong. In the 1991 census, they constituted up to 81% of the total Chinese immigrants in Canada. Of these, Hong Kong accounted for 41.2%, mainland China 41.6%, and Taiwan 17.2%. In this chapter, the cumulative cohort fertility rates or children-ever-born of the 1991 census in the three areas are considered to be the indicator of reproductive norms and attitudes of the sending societies. We assume that the female immigrants would act as non-immigrant Chinese women in these three areas if they did not immigrate to Canada. The cumulative age specific fertility rate or children-ever-born by age in mainland China, Hong Kong and Taiwan, are assigned to individual Chinese women who emigrated from corresponding areas.

Chinese immigrants who did not originate from mainland China, Hong Kong and Taiwan, are considered to be from one of the three areas, which exhibits the similar level of socioeconomic development as their home country. For instance, Chinese immigrants from Vietnam are included in the category of mainland China. Immigrants from Singapore are included as having been from

Hong Kong.

Child immigrants have been conceptualized as those who entered Canada before their twentieth birthday. It can be assumed that they had not formed their reproductive attitudes before the arrived. Chinese traditional cultural influence on their reproductive behaviour could be weaker as compared to adult immigrants, whereas it could be stronger as compared to the native-born Chinese. This influence comes partially from the home countries and partially from their parents. For this reason, two variables, those of "parent generational fertility" and "sending country fertility" are employed to represent normative influences on Chinese child immigrants.

As mentioned above, Chinese reproductive norms have changed gradually over time. The norm of large family size has been replaced by small family size. However, it cannot be assumed that pronatalist characteristics have completely vanished. First, traditional reproductive norms concerning family size still exert a certain influence on some Chinese families. Secondly, since the traditional family value of continuing clans and generations sustains strong influence on Chinese family life, son preference (and universal marriage to some degree) has not lost its significance in reproductive norms. This would keep the fertility rate in the Chinese world higher than that in western countries.

5.3 Descriptive Overview

Table 5-1 shows the cohort cumulative fertility rate or children-ever-born of the British in Canada, the Chinese in three sending areas, and the Chinese parental generation in Canada. It has been reported that the total fertility in the whole Chinese world dropped dramatically in the 1980s. This table, however, shows otherwise. When compared to the British, Chinese fertility pattern still displays pronatalist endowments.

Chinese fertility rates vary by sending areas. It may reflect the slight distinctions of reproductive norms even though all the three areas are still under the Chinese traditional cultural influence. There is no significant difference between the patterns of Taiwan and mainland China, suggesting that uneven socioeconomic development did not have a drastic impact on reproductive norms of the two areas. In several age groups, the number of children-ever-born for mainland China is even lower than that for Taiwan. This can be attributed to the one-child policy carried out during the 1980s. Despite the fact that the average number of children-ever-born in mainland China is still smaller than that in Taiwan, the adjusted rate (standardized on Hong Kong age groups) remains the highest among the three areas.

The rate of children-ever-born in Hong Kong is evidently lower than that in the other two areas. This can be attributed to the western ideology that is embedded in the colony's cultural environment. In addition, the city's geographic size restricts the potential for population growth. Thus, variations of reproductive norms exhibit different social and economic circumstances in the three areas. Finally, we observed that the parental generation exhibits the highest fertility.

Chinese immigrants' children-ever-born by sending areas are shown in Table 5-2. The row "total" (the average number of children-ever-born) is a series of adjusted rates standardized on the age structure of immigrants from Hong Kong. From this table, we found that Chinese women from mainland China have the highest fertility rate not only at the total average but at all age groups. This is somewhat different from the fertility pattern in sending countries as displayed by Table 5-1, in which, at several age groups the number of children-ever-born in mainland China is smaller than that in Taiwan.

It could be that some immigrants left China before the 1980s, when the reproductive norms were not modified by the one-child policy. Thus, they would have advocated for more children concomitant to the existing socioeconomic development level. It is more likely however that once government intervention was no longer a major influence, people would have naturally returned to the original norms. This is particularly true for the Chinese who left China in the 1980s.

5.4 OLS Model and Normative Influence

OLS model is applied to examining normative influence on Chinese fertility behaviour. The fertility patterns, the indicator of reproductive norms, should be variables at the macro-level. For the convenience of discussion, however, they are regarded as variables at the individual level in this section. The equation is given by

$$Y_i=\beta+\beta_j x_{ij}+\xi_i \qquad 5.1$$

(terms defined previously). The model expressed in equation 5.1 is estimated separately for each Chinese group.

Native-born Chinese

As mentioned above, Chinese fertility behaviour is affected by both the mainstream culture and Chinese community culture. The two types of fertility rates, British group children-ever-born (BFP) in the 1991 census and Chinese parental children-ever-born (CFP) are disaggregated into individual native-born Chinese married women. The remaining independent variables are age (AGE), education (EDU, total schooling years), labour force status (EMP dummy variable, 1 = in labour force, 0 = not in labour force), weeks worked in 1990 (WEEKS), annual wage (WAGE), and employment status (FPT, dummy variable, 1=full time job, 0=part time job). Y_i is the number of children-ever-born (CEB) by individual Chinese married women aged 20-49 in the native-born group. The coefficients, Beta values and probabilities (significant T values) are summarized in Table 5-3. Since the variable "age" is somewhat intercorrelated with CFP, as shown by the correlation matrix, we do not include it in the final results (see Appendix A-4 for detail).

As observed in chapter 3, EDU, WAGE, and labour force activities variables like WEEKS, FPT, and EMP have negative effects on CFB. Both CFP and BFP positively affect native-born Chinese fertility, but BFP is not statistically significant. Moreover, CFP's Beta value is substantially larger than BFP, indicating that Chinese parental fertility pattern plays a more important role in forming native-born Chinese fertility than British pattern does.

Child Immigrants

For this group, the variable of Chinese reproductive norms is operationalized as parent generational fertility pattern (PFP) and the sending country fertility pattern (CFP). British fertility pattern (BFP) is regarded again as the indicator of reproductive norms in the mainstream Canadian culture. The remaining independent variables are the same as these in the native-born model. The coefficients, Beta values, and probabilities (sig T) are summarized in Table 5-3. We only need to discuss the three normative variables here. All the three variables have positive effects on child immigrants' fertility. However, it is only sending country fertility pattern (CFP) that achieves statistical significance. Hence, child immigrants' fertility behaviour would be more closely related to reproductive norms in home countries. The sum of Beta value for CFP and PFP is larger not only than that for BFP but also than that of CFP in the native-born group. It may indicate that Chinese cultural influence on child immigrants is stronger than on the native-born group.

Adult Immigrants

Fertility patterns in mainland China, Taiwan and Hong Kong (CFP) are used in our analysis of cultural effects on Chinese adult immigrants' fertility behaviour. British group fertility pattern (BFP), as mentioned earlier, is the indicator of mainstream culture. These Chinese women who arrived in Canada between 1986 and 1991 and were aged 44-49 at the time of the 1991 census are not considered in this model because they had probably completed their potential for reproduction before entering Canada. The coefficients, Beta values and T Values are summarized in Table 5-3.

For the first time British fertility pattern achieves statistical significance, but its values of Beta and sig T are not as strong as compared to Chinese fertility pattern in the sending countries, which, in term of Beta value, alone makes up nearly 50% of the changes in adult immigrants' fertility. Also in terms of the Beta values, we found that CFP effect in the adult model is the strongest among the three models, reflecting adult immigrants' longer socialization in their home countries.

5.5 Conclusion

Culture is considered to be the key element of man's material life and spiritual life. In this study, culture mainly constitutes morals and the value system in a society. Norms, as a medium between culture and man's conduct, concretize the abstract doctrines of morals and values, thus guiding man's behaviour. Culture is hardly altered while norms are changed periodically. Having the capacity of incorporating socioeconomic changes with traditional values, norms become the emphasis of examining cultural influence in this study. Fertility patterns in sending countries and ethnic groups are employed as the indicator of reproductive norms.

As compared to British fertility pattern, Chinese pattern as a whole is still characterized by pronatalist elements. It was observed from our results in the OLS models that in all the three groups, Chinese fertility patterns maintain a closer correlation with the dependent variable as compared to British pattern. This indicates that Chinese ethnic reproductive norms predominated Chinese fertility behaviour in Canada.

Immigrants, especially adult immigrants, experienced more influence from Chinese reproductive norms than their native-born compatriots. This explains why the foreign-born Chinese have higher fertility rates than the native-born Chinese while the former's RES is worse than the latter's as we discovered in Chapter Four. The strong influence from Chinese reproductive norms as governed by high fertility culture effectively offsets the negative impacts of insecurities, thus encouraging the Chinese to have more children.

Chapter 6

Insecurities, Culture, and Immigration

In the previous chapters, we discussed the impacts of economic insecurity, immigration process, and reproductive norms on Chinese immigrants' fertility behaviour separately. In this chapter, we intend to explore the compounding effects of these factors.

6.1 Multilevel Cross-classified Model

Chinese immigrants in Canada can be classified both by the sending areas (i.e., Hong Kong, Taiwan, and mainland China) and by social classes based on education levels. As mentioned above, fertility patterns or the contents of reproductive norms are not the same in the three areas. Meanwhile, Chinese husbands' economic securities or insecurities vary with different social classes. Thereby, immigrants' individual fertility behaviour is under the influence of both such classifications. A two-level cross-classified model is a statistical tool appropriate to the occasion. In this model, the ith Chinese married woman is classified by the *j*th social class (elementary school, junior high school, high school, university, and M.A.+), and *k*th area (Kong Hong, Taiwan, and mainland China). Suppose that we have the following scenario: p explanatory variables

$X_{pi(jk)}$ (p=1,..P) at the individual level, one explanatory variable G_{1j} at the social class level, and one explanatory variable G_{1k} at the sending area level. The micro-level equation is given by:

$$Y_{i(jk)}=\beta_{0(jk)}+\beta_{p(jk)}X_{pi(jk)}+\xi_{i(jk)} \tag{6.1}$$

here Y is the micro dependent variable, X is the micro regressor (independent variable), j=1, ...J, and k=1, ...K denote contexts at the cross-classified macro level, and i=1, ...n_{jk} denotes the micro observation within these contexts. The intercept $\beta_{o(jk)}$ and the slopes $\beta_{p(jk)}$ are treated as random variables at the social class and geographic area levels that can be modelled by the class variable G_{1j} and area variables G_{1k}. Thus we obtain the macro part of the model:

$$\beta_{o(jk)}=\eta_{oo}+\eta_{o1}G_{1j}+\eta_{02}G_{1k}+\eta_{o3}G_{1j}G_{1k}+\alpha_{o(jk)} \tag{6.2}$$

$$\beta_{p(jk)}=\eta_{po}+\eta_{p1}G_{1j}+\eta_{p2}G_{1k}+\eta_{p3}G_{1j}G_{1k}+\alpha_{p(jk)} \tag{6.3}$$

We acquire a single equation expression for the two-level cross-classified model by substituting equation 6.2 and 6.3 into equation 6.1

$$Y_{i(jk)}=\eta_{oo}+\eta_{o1}G_{1j}+\eta_{02}G_{1k}+\eta_{o3}G_{1j}G_{1k}+\eta_{po}X_{pi(jk)}$$

$$+\eta_{p1}X_{pi(jk)}G_{1j}+\eta_{p2}X_{pi(jk)}G_{1k}$$

$$+\eta_{p3}X_{pi(jk)}G_{1j}G_{1k}+(\alpha_{0(jk)}+X_{pi(jk)}\alpha_{p(jk)}+\xi_{i(jk)}) \qquad 6.4$$

Like the simple two-level RC model in chapter 3, this model is a mixed model, containing fixed coefficients (the η's) and random coefficients (the α's)

Children-ever-born (CEB) by married Chinese female immigrants aged 20-49 is the dependent variables $Y_{i(jk)}$. Chinese adult immigrants aged 45-49 and immigrating to Canada between 1986-1991 are not considered in this model because they had finished their child bearing before entering Canada. We have seven independent variables at the individual level. These include age (AGE), income (WAGE), labour force status (EMP: in labour force=1, not in labour force=0), employment status (FPT, full time=1, part time=0), weeks worked in 1991 (WEEKS), education (EDU, total years of schooling year), immigration years (IMM), which is an indicator of assimilation, and British community fertility pattern (BFP), which is the indicator of mainstream culture and is treated as a variable at individual level. Immigrants who obtained their landed immigrant status in 1991 are not considered in this chapter.

The independent variable at the social class level is Chinese husbands' RES within five education levels while the independent variable at the area level is represented by the fertility patterns in Hong kong, Taiwan and mainland China in 1991. The parental fertility pattern, an indicator of normative influence on child immigrants, is not considered at this time. To some degree, Chinese reproductive norms would be accurately measured by the fertility pattern in sending areas more than the parental fertility pattern. For similar reasons mentioned in Chapter 3, we assume that groups at social class and area levels are randomly sampled.

This chapter focuses on the mutual function of two structural factors, immigration process and economic security (RES), and a normative factor CFP. Chinese normative influence on immigrants would be affected by immigrants' relative economic status (RES). If immigrants are economically insecure, the importance of following the origin reproductive norms will be replaced by economic consideration. Otherwise, reproductive norms will play a more effective role in the immigrant fertility formation. In Chapter 4, we did not find a relationship between immigration years and immigrant fertility, as predicted by the assimilation hypothesis. It is possible that the assimilation process first acts on origin cultural influence on immigrants, and indirectly affects immigrant fertility behaviour. We hypothesize that:

1) Effects of Chinese normative influence (CFP) will operate effectively when immigrant husbands make progress in their relative economic status, and vice versa.

2) Chinese reproductive norms have strong positive impact on immigrant fertility behaviour. Under the assimilation hypothesis, this impact will decrease when the period of immigration becomes longer.

6.2 Results

The first step of analysis in cross-classified model does not involve interaction terms, and it is also assumed that the term $X_{pi(jk)}\alpha_{p(jk)}$ is zero. Equation 6.4 is simplified as:

$$Y_{i(jk)}=\eta_{oo}+\eta_{o1}G_{1j}+\eta_{o2}G_{1k}+\eta_{po}X_{pi(jk)}+(\alpha_{o(jk)}+\xi_{i(jk)}) \qquad 6.5$$

Since the level 2 variation results from the sum of random variable of social classes and geographic area, the above equation could be rewritten as:

$$Y_{i(jk)}=\eta_{oo}+\eta_{o1}G_{1j}+\eta_{o2}G_{1k}+\eta_{po}X_{pi(jk)}+\upsilon_j+\upsilon_k+e_{i(jk)} \qquad 6.6$$

where υ_j is a random departure due to social class j, υ_k is a random departure due to sending area K, and $e_{i(jk)}$ is an individual-level random departure.

The parameter estimates, constant and variance are summarized in Table 6-1. The estimates are statistically significant except for WEEKS (at 5% level). The signs of these parameter estimates are the same as we have observed in the previous chapters. In particular, IMM, RES, and CFP have positive effects on

CEB. From this table, we found that random variance among social classes diverges at a wider level than that among the sending areas. It may demonstrate that distinctions of reproductive norms in the three sending areas did not generate so much variation as disparities of RES in social classes did on Chinese immigrant fertility.

The next step involves the addition of two interaction terms, CFP*RES and CFP*IMM. This model is the complete two level cross-classified model defined by Equation 6.4. For the convenience of analysis, we omit some interaction terms. Table 6-1 presents the results. Compared to Equation 6.6, the variance at individual level increases from 0.9741 to 0.9937 and the sum of variances at social class and area level decreases from 0.02260 to 0.0131.

After interaction terms are added to the equation, the compound effects of husbands' economic insecurity, fertility patterns in sending countries, and immigration process cannot be accurately reflected in Table 6-1. Table 6-2 displays the conditional partial derivative with respect to CFP conditional on RES at five education levels and three assimilation levels (presented by three periods of immigration, i.e., 1 year, 10 years and 20 years of immigration).

In this table, the positive effects of CFP in sending countries increase with the shift from low RES to high RES and decrease with the shift from low assimilation level to high level, and vice versa. This finding firmly supports both "insecurities" hypothesis and assimilation hypothesis.

6.3 Conclusion

Multilevel cross-classified model was applied to the analysis of compound effects of various factors, especially economic security, normative factors, and immigration process. Chinese origin cultural influence varied with the degree of husbands' RES and assimilation level. The influence would become quite strong if the Chinese families belong to a social class where the husbands had relative economic security or if the Chinese women had moved to Canada relatively recently. On the other hand, this influence could be very weak if the husbands are not secure economically or if the wives had immigrated to Canada a long time ago. The findings show no substantive difference with those observed in previous chapters. However, it is clear now that assimilation played a certain role in Chinese immigrant fertility behaviour through the effects of Chinese origin cultural influence. Child immigrants are more likely to distance themselves from their origin culture than adult immigrants.

Chapter 7

A Comprehensive Analysis of Chinese Fertility

In the previous chapters, Chinese fertility was explored in the context of three separate subgroups of the Chinese community in Canada. Those analyses cannot provide a comprehensive explanation of Chinese fertility behaviour. As indicated by the theoretical model in Chapter 2, reproduction is affected by both structural and normative factors simultaneously. This chapter is intended to shift the focus of analysis to a simultaneous investigation of all the factors discussed in previous chapters.

7.1 OLS Model Analysis

We will first explore fertility variations as influenced by micro-level variables. A single-level dummy variable regression model is utilized and the basic equation is given by:

$$Y_i=\beta_o+\beta_1G_1+\beta_2G_2+\beta_jX_{ij}+\xi_i \qquad 7.1$$

where Y_i is children-ever-born by Chinese married women i, β_o is the intercept representing mean fertility of the native-born Chinese when all other variables included in the model are set to zero. In addition, G_1 and G_2 are the immigrant status dummy variables, while X_{ij} represents Chinese woman i on control variable j and ξ_i is the error term. Immigrant status is included in the model first, followed by age (AGE), education (EDU), number of years since immigration (IMM). British community fertility pattern (BFP) is also regarded as a micro variable on the assumption that it affects the fertility behaviour of every Chinese woman. The remainder of the independent variables at the individual level include EMP, FPT, WAGE, and WEEKS (worked in 1991). Since the native-born Chinese do not have a period of immigration, they are all assigned a total of 50 years of immigration to represent the longest duration of residence in Canada, as a proxy for assimilation (i.e., they are more assimilated). Immigrant status is measured by two dichotomous dummy variables: Chinese married women are given a score of one if they fall within a given immigrant subgroup (i.e. adult immigrant = 1, and child immigrant = 1); the native-born Chinese are the reference group and are given a score of zero for both of these dummy variables. When scored in this manner, the estimates of the regression coefficients of the two dummy variables may be interpreted as the average deviation in fertility of the immigrant status group from the mean fertility of the native-born Chinese.

Gross and net deviations in the average number of children-ever-born for the two immigrant groups of Chinese married women from those of native-born Chinese women are shown in Table 7-1. The gross deviations (in the first column of the table) indicate average fertility deviations for that group from the mean value for native-born Chinese women without controlling for the influence of any other variables. These deviations are consistent with the findings in Table 4-4, which show that adult Chinese immigrants have the highest actual average rate of children-ever-born while the native-born Chinese have the lowest among the total Chinese population in Canada.

The net deviations describe that group's deviation from the mean fertility of native-born Chinese women after the controls have been included. From Table 7-1 we can see that the addition of age has significantly changed the fertility pattern. The large proportion with older age groups explains why adult immigrants have the largest average number of children-ever-born while their specific fertility (children-ever-born) by age group is lower than child immigrants (see Table 4-4). Therefore, the addition of age to the equation changes the situation and makes child immigrants the group of the highest fertility (children-ever-born). As education is added to the equation, the net deviations for both immigrants groups decline. The fertility of adult immigrants is even lower than that of native-born Chinese, reflecting the fact shown on Table 4-1 where native-born Chinese women are the best educated.

The longer length of staying in Canada, as observed in Chapter Four, encouraged rather than depressed Chinese immigrant fertility. The addition of immigration years raises the fertility of both child and adult immigrant groups, resulting in adult immigrants' fertility being higher than the native-born Chinese. This indicates that adult immigrants would have more children if their length of living in Canada was longer than actual.

British fertility, the indicator of mainstream culture, is once again treated as a variable at the individual level. The addition of this variable does not cause a dramatic change in the net deviation. It is also not statistically significant. This finding reinforces our previous observation that mainstream culture has little impact on Chinese fertility behaviour.

Immigrant husbands were unable to match their native-born compatriots in economic status. Likewise, immigrant wives' financial condition was inferior to that of native-born Chinese wives. According to our estimation based on the 1991 census, the annual wage was $ 20307 for the native-born Chinese wives, $ 18,100 for child immigrant wives and only $ 13,174 for adult immigrant wives. We found that the addition of WAGE to the equation extensively raises the deviations of the two immigrant groups. Thus, the improvement of economic status would encourage Chinese female immigrants to have more children. Wife's income plays a similar role to husband's RES on fertility behaviour. According to our calculation, Chinese women in the child immigrant group had almost the same labour force participation rate as the native-born Chinese did even though they worked more time. On the other hand, Chinese women in the adult immigrant group worked less time and had lower labour force participation rate than the native-born group did. When the three labour force activity variables (EMP, FTP, WEEKS) are added to the equation, the deviation of both immigrant groups increases rather than decrease. It seems that adult immigrants fertility behaviour would not be negatively affected by the increase of labour force activities.

7.2 Multi-level Analysis- Insecurities Effects

This analysis is similar to the one undertaken in Chapters Three and Six. However, the unit of analysis here is Chinese married women aged 20-49. Following Hox's approach adopted in Chapter Three, we first examine the micro-level-only model, which contains explanatory variables at the individual level as fixed variables. We assume again that the term $X_{pij}\alpha_{pj}$ is zero. The equation is given by:

$$Y_{ij}=\eta_{OO}+\eta_{01}Z_{1ij}+\eta_{02}Z_{2ij}+\eta_{po}X_{pij}+(\alpha_{oj}+\xi_{ij}) \qquad 7.2$$

(terms defined previously).

This differs from equation 3.8 in Chapter Three as two immigrant-status dummy variables Z_{1ij} and Z_{2ij} are added to the equation. Note that Chinese married women aged 45-49 who entered Canada between 1986 and 1991 are not included in this model as they had probably finished their reproduction before arriving in Canada. Y_{ij} represents the children-ever-born by Chinese married women. All independent variables are the same as these in the equation 7.1 of the OLS model. The parameter, estimates, constant, and two variance estimates, σ^2_ξ for the residual variance at the class level, and σ^2_u for constant variance at individual level, are summarized in Table 7-2. All variables except BFP and WEEKS are statistically significant. The signs of these parameter estimates are the same as those in the previous OLS model. However, when compared to the coefficients of the two immigrant-status dummy variables in the OLS model, the estimates of the two variables in the RC model decrease. This demonstrates that fertility differentials between immigrants and the native-born Chinese diminish when class variances are controlled statistically.

The next step involves the addition of the macro level class variable G_{ij}, Chinese husbands' RES at five education levels.

$$Y_{ij}=\eta_{oo}+\eta_{01}Z_{1ij}+\eta_{02}Z_{2ij}+\eta_{03}G_{1i}+\eta_{po}X_{pij}+(\alpha_{oj}+\xi_{ij}) \qquad 7.3$$

(terms defined previously).

This model is similar to Equation 3.9 in Chapter 3 except for the fact that two immigrant-status dummy variables are added to the equation. The parameter estimate, constant, and variance are also listed in Table 7-2. The addition of RES to this model reduces estimates of the two immigrant-status dummy variables, even though RES itself brings a positive impact on individual fertility behaviour. We will explain this later.

7.3 Multi-level Analysis: Normative Influence

In Chapter Five, normative influence was examined on respective groups by OLS model. Now, a multi-level RC model is applied to the comprehensive analysis of the influence of the normative factors as well as other factors on all of the three subgroups.

In the general theoretical framework, Chinese individuals act under the influence of structural and normative factors at three levels: society (level III), group and social class (level II) and individual (level I). As mentioned previously, British fertility pattern, the indicator of mainstream culture at society level, is regarded as a normative factor at the individual level. The society level is omitted in this analysis.

Level II is a cross-classified level. The Chinese people in Canada could be classified both by immigrant status (i.e., native-born, child immigrants, and adult immigrants) and by social classes (i.e., education levels). Correspondingly, we have two variables at this level: Chinese husbands' RES, which is a structural variable of social classes, and Chinese fertility pattern which is a normative variable of immigrant-status groups, on the assumption that these classes and groups are all randomly sampled.

Chinese women's socioeconomic characteristics including age, income, education, labour force activities, and immigration years are the structural variables at the individual level. Thus, we have variables at two levels in this analysis - macro and micro.

The two-level cross-classified model illustrated in chapter 6 is applied to this comparative analysis. This time, however, we do not need to calculate variances σ^2_{u1} and σ^2_{u2} at Level II separately because in the two dummy immigrant-status variables Chinese married women have been classified into three groups. The variances among the three groups could be presented by the estimates of the two dummy variables. The following equation is derived from Equation 6.4 but includes two immigrant-status dummy variables.

$$Y_{i(jk)}=\eta_{oo}+\eta_{01}Z_{1ij}+\eta_{02}Z_{2ij}+\eta_{o3}G_{1j}+\eta_{o4}G_{1k}+\eta_{po}X_{pi(jk)} \qquad 7.4$$

$$+(\alpha_{o(jk)}+X_{pi(jk)}\alpha_{p(JK)}+\xi_{i(jk)})$$

(terms defined previously).

As indicated earlier, the unit of analysis is Chinese married women in all three groups aged 20-49 except for these aged 45-49 who entered in Canada between 1986 and 1991. $Y_{i(jk)}$ is children-ever-born and the two macro-level variables are RES and CFP (i.e., husband relative economic status and Chinese fertility pattern for the three groups). All the independent variables at the micro-level are the same as those in equation 7.3.

The results are summarized in Table 7-3. All variables, except for BFP and WEEKS, are statistically significant. Chinese fertility pattern, the indicator of Chinese normative influence, as observed in Chapters 5 and 6, has a positive effect on the fertility behaviour of the Chinese in Canada. The overall conclusion from Table 7-3 differs from those of Equation 7.3 in Table 7-2. The level II variance estimate is 0.009887, which is less than the estimate of 0.08914 in Table 7-2. More importantly, the estimates of two immigrant-status dummy variables, is larger than those in Table 7-2, illustrating that the addition of the normative factor to the equation significantly raises the fertility of the two immigrant groups.

The subsequent model is Equation 7.5, which is a complete cross-classified model and is similar to Equation 6.4 in Chapter 6.

$$\begin{aligned} Y_{i(jk)} = {} & \eta_{oo} + \eta_{01} Z_{1ij} + \eta_{02} Z_{2ij} + \eta_{o3} G_{1j} + \eta_{04} G_{1k} \\ & + \eta_{o5} G_{1j} G_{1k} + \eta_{po} X_{pi(jk)} + \eta_{p1} X_{pi(jk)} G_{1j} + \eta_{p2} X_{pi(jk)} G_{1k} \\ & + \eta_{p3} X_{pi(jk)} G_{1j} G_{1k} + (\alpha_{o(JK)} + X_{pi(jk)} \alpha_{p(jk)} + \xi_{i(JK)}) \qquad 7.5 \end{aligned}$$

This model includes the interaction terms of micro and macro variables. In this section, the following interaction terms are considered: RES with immigration years (RESIMM), RES and Chinese fertility pattern with immigration years (RCI), Chinese community fertility with immigration years (CFPIMM), adult immigrant dummy variable with RES (ADURES), adult immigrant dummy variable with Chinese fertility pattern (ADUCFP), adult immigrant dummy variable and RES with Chinese fertility pattern

(ADURESCFP), child immigrant dummy variable with RES (CHIRES), child immigrant dummy variable with Chinese fertility pattern (CHICFP), and child immigrant dummy variable, RES with Chinese fertility pattern (CHIRESCFP). The results show that some interaction terms (with star sign in Table 7-3) do not achieve statistical significance. The level II variance estimate (0.004695) is less than the estimate of 0.009887 in Equation 7.4. The interaction term "RCI", representing a compound effect of economic securities, Chinese reproductive norms, and immigration process, has a positive impact on Chinese fertility behaviour. We observed that the addition of interaction terms raises estimates of the two immigrants-status dummy variables, especially the adult immigrant dummy variable.

After the addition of interaction terms, the estimates of two immigrant-status dummy variables do not accurately reflect the effects of immigrants status on children-ever-born because these effects depend on the level of RES and CFP. For this reason, Table 7.4 displays the immigrant-status effects conditional on specified levels of RES and CFP (as represented by the average number of children-ever-born in the three areas).

From this table we found that the two immigrant groups' net deviations of children-ever-born from those of the native-born Chinese increase with the shifting from low fertility area to high fertility area. For instance, in the adult immigrant group, Chinese women who come from Hong Kong and whose husbands' RES is 76.7 (i.e., at the class of junior high school education) have an implied average of 0.223 children more than native-born Chinese women have. If these women at the same class come from mainland China, they would have an average of 0.283 children more than native-born Chinese women. This is consistent with our hypothesis that Chinese reproductive norms positively affect Chinese fertility behaviour.

However, it was observed that the two groups' net deviations decrease with the shifting from low RES to high RES. For example, at the highest level of RES (RES=104) in the adult immigrant group, Chinese women emigrating from the area of the lowest CFP (1.565), which is the average rate of CFB in Hong Kong, have an implied average of 0.703 children fewer than the native-born Chinese women. At the lowest level of RES (RES=64.1), Chinese women from the same area only have an implied estimated average of 0.651 children more than the native-born Chinese. This result seems to contradict our hypothesis that the improvement of husbands' RES would encourage their wives to have more children. There could be several explanations for the situation.

First, for the native-born Chinese, RES becomes worse with increasing education. Yet, this kind of relationship, as illustrated in chapter 4, does not exist clearly in the two immigrant groups. For instance, of the native-born Chinese, husbands with M.A. and beyond degrees may feel most insecure economically. However, RES for immigrants with the same education is not the worst. This could distort the fertility comparison between native-born and immigrant groups when controlling for RES.

Second, cultural or normative influence on immigrant fertility behaviour may prevail over the "insecurities" effects, which cannot effectively intervene the reproductive behaviour of Chinese immigrants especially well-educated immigrants. In reference to cultural influence, adult immigrants could bear more children than the native-born Chinese did, even though their RES is not as great as their native-born compatriots'.

Third, compared to immigrants, native-born Chinese fertility highly depends on the RES level. Therefore, economic security would certainly foster native-born Chinese child-bearing. When RES reaches more than unit one, their CFB would closely resemble the maximum required by the ethnic reproductive norms within a given class. However, the reproductive process of the foreign-born Chinese, especially the adult immigrants, is sharply disrupted by immigration affairs. Even though immigrants at the lowest class enjoyed the same economic security as did the native-born Chinese at the same class, they might not be able to bear as many children as what their ethnic values would have dictated. Under such circumstances, there would appear to be a negative deviation of the adult immigrant group from the mean fertility of the native-born Chinese as shown in the table. On the other hand, in the face of the deteriorating RES, the native-born Chinese would quickly respond by reduction of child-bearing. For immigrants, however, strong traditional cultural influence would slow down the negative effects of RES and keep their fertility at a certain level. Thus, in this context, a positive fertility gap between the two subgroups would likely appear. This positive gap could be widened with the decreasing score of RES.

It is observed from the table that child immigrants at the lower class have more children than adult immigrants at the same class. It may reflect the function of disruption on the latter. On the contrary, child immigrants at high class have fewer children than adult immigrants at the same class. It may indicate that assimilation played certain role in the fertility behaviour of well-educated child immigrants.

7.4 Conclusion

In this chapter we first examined impacts of structural and normative variables at the individual level. Then we extended the analysis to structural variable - "RES" at the social class level, and the normative variable "CFP" at the group level.

At the micro-level, age and education are the two critical factors in affecting Chinese children-ever-born. Adult immigrants have an older population and lower education level than the other two subgroups. Thus, the addition of the two factors evidently reduces adult immigrants' deviation in the average number of children-ever-born from the mean value of the native-born Chinese. Deviations of the two immigrant groups rise when years since immigration are controlled, indicating that a longer period of residence in Canada would see immigrants bear more children.

The positive effect of RES on the Chinese fertility behaviour was observed in the multi-level model. However, the estimates of the two immigrant-status dummy variables conditional on RES and CFP do not increase but instead decrease with the shifting from the low RES to high RES classes. This could mainly be attributed to the elasticity of response to RES: Since the native-born Chinese are highly sensitive to their relative economic status, changes in RES would affect their fertility-decision more significantly than immigrants. This has therefore generated decreasing variances between immigrants and the native-born Chinese at high RES level and an increasing positive fertility gap at low RES level.

Chapter 8

Discussion and Conclusion

This dissertation has attempted to overcome certain methodological problems identified in the literature concerning minority-status hypothesis and cultural influence, exploring the impacts of discrimination, economic security, immigration process, and other factors on fertility behaviour from both the structural and the normative perspectives. Data from the Public Use Sample Tapes (PUST) of the 1991 Canada census were utilized. This study has focused on the rate of group context on actions of individuals, by applying contextual analysis as the major statistical tool to analyse fertility differentials.

8.1 Limitations of the Study

An important limitation in this study is imposed by a lack of available information. For instance, the family file of the PUST does not contain any information on marital relationship for Chinese husbands and their wives. Instead, we utilize data from the individual file, assuming that married Chinese males are the husbands of married Chinese females in the same file, and that Chinese wives are in the same social class as their husbands. This assumption is not necessarily conformed to reality. More precise information is likely to improve the analysis.

Socioeconomic variables including income, education, and labour force activities are current characteristics of the Chinese population at the time of census. However, the fertility measure in this study is the number of children-ever-born. which is a cumulative measure. Obviously, current fertility data would be more valuable to establishing an explicit causal model for Chinese fertility behaviour and determinants. Children-ever-born is also used as the measurement of British fertility pattern and Chinese fertility pattern for home and sending countries. Unfortunately, the censuses in Hong Kong and Taiwan do not include the question of children-ever-born. Therefore, we used cohort fertility rates - a combination of a set of age specific birth rate, derived from vital statistics - to obtain a measure of the cumulative fertility, as the substitute of children-ever-born in the two areas. By doing so, a comparison of fertility pattern among the three areas would be probably distorted somewhat.

Chinese reproductive norms are operationalized into the parent fertility pattern and the sending country fertility pattern in this study. Chinese pronatalist culture greatly resides in son preference. Hence, Chinese fertility pattern should consist of two important aspects: family size and sex ratio (as an indicator of son preference). Nevertheless, the latter was not included in this study due to unavailable data.

In the analysis of immigrant fertility, the place of birth was used to determine the home country for immigrants. Some immigrants emigrated from Hong Kong and Taiwan but were born in mainland China. In this case they would be treated as immigrants from mainland China. In a similar vein, the number of immigrants classified in mainland China was over-estimated. This, in turn, would probably undermine the representation of a sending country fertility pattern and thus affect the evaluation of cultural influence on Chinese fertility behaviour.

8.2 Major Findings and Implications

Despite these limitations, this study provides some new and useful insights into minority and immigrant fertility behaviour in Canada. Among the major findings, the interaction of discrimination, a structural factor at the level of social class, and Chinese individual fertility behaviour emerges as quite important determinants of fertility.

It is well known that many minority groups in North America have relatively high fertility at low social classes and lower fertility at middle-and-upper classes than the majority population. However, previous research concerning both minority group status and characteristics hypotheses have not provided us with a satisfactory explanation of this pattern of differences. This study, in the case of Chinese fertility in Canada, suggests that discrimination measured by RES which varies over social classes could be a critical factor in affecting minority fertility behaviour. A minority member suffers from two types of discrimination: discrimination prevailing in society at large and discrimination within a person's social class. These two types of discrimination, especially the discrimination within a person's class, as manifested through one's personal income, would determine a minority member's economic security not only in the dominant society but also within that member's specific social class. This study has shown that discrimination against the Chinese seems less severe at lower classes than at the middle and the upper classes. On the one hand, a poorly educated Chinese man may feel secure economically in his class despite his inferior economic status in the overall society. In this context, Chinese reproductive ideology would serve to facilitate child bearing. On the other hand, a well-educated Chinese man may feel insecure economically in his own class even though his economic condition is favourable in society. Under these circumstances, his wife would likely increase her labour force activity and thus reduce child bearing in order to keep up with the status and consumption standards of their social class. Therefore, in affecting minority individual reproductive behaviour, discrimination within a given social class plays a more important role than discrimination in society under the given income.

Another important finding involves the role of culture on fertility. Results from the contextual analysis have shown that Chinese fertility pattern, as an indicator of Chinese reproductive norms, has a strong influence on Chinese fertility behaviour especially on Chinese immigrant fertility behaviour. It is Chinese cultural influence that helps Chinese immigrants quickly attain their fertility pattern once they are over the initial immigration period. Cultural influence effectively counteracts the negative impact of economic insecurity on immigrant fertility behaviour. This is a critical event resulting in high fertility for adult immigrants even though they experience extensive economic insecurity due to immigration.

Traditional Chinese cultural influence would diminish with the increasing exposure to the destination society as predicted by the assimilation hypothesis. Assimilation function combined with "insecurities" effects fairly explains the lowest fertility maintained by the native-born Chinese among the three subgroups. However, the action of assimilation should not be overplayed as our analysis in Chapter Five illustrated that even among the native-born Chinese, the influence of Chinese reproductive norms is still stronger than that of the mainstream Canadian culture

The native-born Chinese with university education and beyond made up nearly 67% of the total married population in this group. If the native-born Chinese continue to elevate their education levels, and discrimination continues to prevail on the middle and upper classes, the average fertility level for this group will remain low or possibly decrease even further.

Disruption associated with the immigration process played a major role in depressing Chinese immigrant fertility. After a period of immigration, immigrants especially adult immigrants would speed their child bearing. Compared to adult immigrants, child immigrants' reproduction would be less likely disrupted by immigration process. This could be an important reason why they bore more children than adult immigrants.

8.3 Future Research

Earlier discussions have pointed out various limitations of this analysis that can be improved upon in future research. Several other directions for future research are identified in this section.

One dimension that needs to be explored is to extend the study of discrimination thesis to other minority groups. We have concluded from this study that discrimination variations over social classes are a major factor causing class fertility differentials between the Chinese and the British. Whether this conclusion is applicable only in the Chinese case or it is of general significance depends on the application of the thesis to other minority groups.

Dynamics of cultural influence on reproduction is another area of further study. Although traditional reproductive values such as "having sons to continue clans and generations" still remain a powerful influence on Chinese reproductive norms, it has been reported, nevertheless, that these values are progressively losing their importance among the younger generation. Thus reproductive norms, as directed by traditional values, vary not only with certain groups (i.e., native-born and foreign-born) but also with generations. This topic has not been explored by any studies on the Chinese in Canada.

Fertility pattern of the home country was regarded as the indicator of normative factors. We asserted that it does not fully measure Chinese reproductive values since it does not include the information on sex preference. However, even when sex ratio is taken into account, a more precise direct measurement of reproductive norms is still necessary. Moreover, this study has focused on the role of group normative context on individual actions. The interaction between individual fertility behaviour and individual attitudes to reproduction, which happens to be a reflection of ethnic norms and directly related to fertility outcome, has never been explored in the context of minority fertility. In doing so, a direct indicator of measuring individual attitude to child bearing is required. Future survey data may help solve this issue. In previous surveys, a question like "how many children do you want" was often asked to measure people's demand for children or attitude to family size. In answering this question, most respondents have taken all financial and time constraints into account. Therefore, their replies do not purely reflect the cultural influence. In future surveys, measures could be taken to improve these types of survey items to better reflect cultural considerations from non-cultural bases of fertility.

Table 2-1

Variables and Corresponding Measurements

Variables	Measurement
Variables at National Level	
British Fertility Pattern (BFP) (proxy of the main stream culture)	Numbers of Children-ever-born to British women aged 14-49
Variables at Community Level	
Chinese Parent Fertility (PFP/CFP) (proxy of Chinese culture)	Numbers of Children-ever-born to Chinese women aged 20-49 in the 1971 census
Chinese Fertility Pattern in Sending Country Fertility (CFP) (proxy of Chinese culture)	Number of Children-ever-born to Chinese women aged 20-49 in the 1990/1991 censuses in Taiwan, Hong Kong, and Mainland China
Chinese Husband Relative Economic Status (RES) (proxy of discrimination)	$\frac{\text{Chinese husbands' annual wage}}{\text{schooling years}}$ (at a given class)
Variables at Individual Level	
Fertility Children-ever-born (CEB)	Number of children-ever-born to women
SES Education (EDU)	Complete years of school
Income/Wage	Annual Income/Wage (Dollars)

Occupation 1 (OCC1)	Professionals = 1, Others = 0
Occupation 2	Semi professionals=1, Others=0
Occupation 3	Skilled Workers = 1, Others = 0
Employment or Labour Force Participation Rate (EMP)	In labour force = 1, Not in labour force = 0
Work Status (FPT)	Full time job = 1, Part time job = 0
Weeks Worked in 1991 (WEEKS)	Weeks worked in the year of 1991
Immigration Years (IMM)	Number of years since Immigration
Demographic Variables	
Age	Age in years at the time of census

Immigration Status Dummy Variables

Child Immigrant Group (CHILDG)	Child immigrants = 1, Others = 0
Adult Immigrant Group (ADULTG)	Adult immigrants = 1, Others = 0

Interaction Terms

Weeks worked in 1991 and Husband Relative Economic Status (WEEKRES)	WEEK * RES
Chinese Fertility Pattern and Husband Relative Economic Status (CFPRES)	CFP * RES
Chinese Fertility Pattern and Immigration Years (CFPIMM)	CFP * IMM
Chinese Husband Relative Economic Status, Chinese Fertility Pattern, and Immigration Years (RCI)	RES * CFP * IMM
Chinese Husband Relative Economic Status and Immigration Years (RESIMM)	RES * IMM
Adult Immigrant Group and Chinese Husband Relative Economic Status (ADURES)	ADULTG * RES
Adult Immigrant Group and Chinese Fertility Pattern (ADUCFP)	ADULTG * CFP
Adult Immigrant Group, Chinese Husband Relative Economic Status, and Chinese Fertility Pattern (ADURESCFP)	ADULTG * RES * CFP

Child Immigrant Group and Chinese Husband Relative Economic Status (CHIRES)	CHILDG * RES
Child Immigrant Group and Chinese Fertility Pattern (CHICFP)	CHILDG * CFP
Child Immigrant Group, Chinese Husband Relative Economic Status, and Chinese Fertility Pattern (CHIRESCFP)	CHILDG * RES * CFP

Table 2-2

Age Distribution of the British and the Chinese In PUST of the 1991 Canada Census

%

	British			Chinese		
Age Group	M (1)	F (2)	Total (3)	M (4)	F (5)	Total (6)
0-4	1.0	0.9	0.9	1.5	1.6	1.6
5-9	3.9	3.8	3.9	6.1	5.5	5.8
10-14	5.5	5.1	5.3	7.6	7.4	7.5
15-19	5.4	4.8	5.1	8.1	6.7	7.4
20-24	6.0	5.6	5.8	8.4	7.8	8.1
25-29	6.8	5.9	6.3	8.3	8.0	8.1
30-34	7.8	7.3	7.5	9.0	9.5	9.3
35-39	8.7	7.8	8.3	10.4	10.9	10.7
40-44	8.6	7.6	8.1	9.4	10.2	9.8
45-49	7.9	7.8	7.9	8.5	8.4	8.5
50-54	6.6	6.1	6.3	4.5	4.6	4.5
55-59	5.6	5.3	5.5	4.2	4.2	4.2
60-64	5.3	5.4	5.4	4.1	3.7	3.9
65-69	5.6	5.7	5.7	3.2	3.6	3.4
70-74	5.6	6.5	6.1	2.6	2.8	2.7
75-79	4.3	5.5	4.9	2.0	2.3	2.1
80 +	5.3	8.8	7.1	2.0	2.9	2.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 3-1

Chinese Husbands' RES by Education & Occupation (age 17-51)
(% of the British)

	Actual RES (%) (1)	Standardized RES (%) (2)
Education		
Elementary	115.8 (n=13)	116.2
Junior High	103.4 (n=25)	104.1
High School	92.2 (n=83)	93.4
University	89.3 (n=169)	86.8
M.A. +	76.0 (n=61)	74.1
Total	85.9 (n=351)	87.2
Occupation		
Skill I	146.8 (n=16)	
Skill II	98.1 (n=68)	
Skill III	87.2 (n=92)	
Skill IV	73.7 (n=148)	
Total	87.3 (n=324)	

Table 3-2

Labour Force Activity of Chinese and British Wives
(age 15-49)

Education	Weeks Worked			Labour Force Participation Rate		
	British	Chinese		British	Chinese	
	weeks (1)	weeks (2)	% of British (3)	% (4)	% (5)	% of British (6)
Elementary	10.5			50.0		
Junior High	20.4			54.5		
High School	35.4	38.9	109.9	77.1	77.5	100.6
University	38.1	42.4	111.3	84.2	86.6	102.9
M.A.$^{+}$	39.4	44.6	113.2	89.8	96.6	107.6
Average	35.9	42.2	117.5	78.9	83.7	106.1

Table 3-3

Labour Force Activity of Non-Married Chinese and British Females
(age 15-49)

	Weeks Worked			Labour Force Participation Rate		
	British	Chinese		British	Chinese	
Education	weeks (1)	weeks (2)	% of British (3)	% (4)	% (5)	% of British (6)
Elementary	33.0	40.0	121.2	30.0	33.3	111.0
Junior High	30.3	29.3	96.7	58.0	75.0	129.0
High School	35.2	32.3	91.8	70.1	55.3	78.9
University	38.7	34.0	89.9	92.2	87.6	95.0
M.A.$^{+}$	39.3	38.2	97.2	90.9	87.3	96.0
Total	36.3	33.7	92.8	75.7	70.9	93.7

Table 3-4

Comparison of Fertility of Chinese and British Wives
(per married woman, age 15-49)

	British		Chinese			
Education	Fertility (Actual) (1)		Fertility (Actual) (2)		% of British (Actual) (3)	% of British (Standardized on Age) (4)
Elementary	2.5000	(n=2)				
Junior High	2.5455	(n=55)	2.9346	(n=18)	115.3	116.8
High School	1.9390	(n=1449)	1.5412	(n=95)	79.5	90.6
University	1.6452	(n=574)	1.2465	(n=197)	75.7	84.4
M.A.$^{+}$	1.5669	(n=117)	0.7586	(n=44)	48.4	60.7
Total	1.8606	(n=2197)	1.3074	(n=354)	71.0	79.3

Table 3-5

OLS Regression of Children-ever-born
Native-born Chinese Wives aged 15-49

Variables	B	sig T
AGE	.088081	.0000
EDU	-.044812	.0178
EMP	-.181279	.5588
WEEKS	-.009023	.0490
INCOME	-.000008	.0449
(Constant)	.700361	.0083

Multiple R = .598, R^2 = 0.358

F = 23.62605, Sig F = .0000

N = 354

Note:

1. AGE = age; EDU = total schooling years; EMP = employment status or labour force participation rate, in labour force = 1, not in labour force = 0; WEEKS = weeks worked in 1990; INCOME = annual income.
2. Correlation matrix is in Appendix A-1.

Table 3-6

Parameter Estimates and Variances of Selected RC Models
Chinese Wives aged 14-49

Variables	Model Equation		
	(3.2)	(3.3)	(2.7)
Fixed Part			
Individual Level			
Constant	-.0283000	-.2400	-.50120
AGE	.0871300	.0866	.10210
WEEKS	-.0103900	-.01085	-.06082
INCOME	-.0000082	-.00001	-.00001
EDU	-.0475321	-.05342	-.08253
Class Level			
RES		.02644	.05222
Interaction Term			
WEEKRES			.000508
Random Part			
σ^2_ε	.6122	.5902	.5172
σ^2_u	.1499	.1252	.1130
Deviance	670	664	647
χ^2		.0003	.0095

a: All estimates of individual level variables and class level variable are statistically significant ($p<.05$). Please see Appendix A-2 for Standard Errors.

b: Age = age; WEEKS = weeks worked in 1990; INCOME = annual income; EDU = total schooling years; RES = relative economic status of Chinese husbands; WEEKRES = WKS * RES.

Table 3-7

Partial Derivative of Weeks Worked (WEEKS)
On Children Ever Born
Conditional on Husband RES

Education Level	Husband RES	Derivative of WEEKS
Elementary	115.8	-.001947
Junior High	103.4	-.008251
High School	92.2	-.013946
University	89.3	-.015420
M.A. +	76.0	-.022182

Table 4-1

Education of the Chinese and the British
(married males aged 17-52 and females aged 15-49) %

	British		Native-born Chinese		Child Immig		Adult Immig	
	M (1)	F (2)	M (3)	F (4)	M (5)	F (6)	M (7)	F (8)
Elementary	0.5	0.09	0.90	0.00	0.50	1.40	1.90	3.10
Junior	4.1	2.50	0.90	0.80	4.00	5.40	6.30	9.50
High	58.9	66.00	30.90	32.90	33.60	43.60	33.80	44.60
University	27.4	26.10	50.20	55.00	45.70	37.50	37.50	33.60
M.A.	9.1	5.31	16.60	11.20	16.10	12.10	20.40	9.10
Total	100	100	100	100	100	100	100	100
	(n=2232)	(n=2197)	(n=351)	(n=354)	(n=563)	(n=547)	(n=2357)	(n=2615)

Table 4-2

Occupation of the Chinese and the British
(Married males aged 17-52 and females aged 15-49) %

	British		Native-born Chinese		Child Immig		Adult Immig	
	M (1)	F (2)	M (3)	F (4)	M (5)	F (6)	M (7)	F (8)
Skill I	27.6	24.4	50.5	35.9	40.9	24.1	41.9	21.3
Skill II	35.3	26.8	24.8	29.1	28.8	24.3	29.4	24.2
Skill III	28.9	38.8	21.0	29.6	24.4	41.7	21.5	40.3
Skill IV	8.21	10.0	3.7	5.4	5.8	9.8	7.3	14.3
Total	100 (n=2210)	100 (n=2185)	100 (n=324)	100 (n=338)	100 (n=430)	100 (n=478)	100 (n=2220)	100 (n=2082)

Table 4-3 Chinese Husbands' RES

By Education

	Native-born		Child Immig		Adult Immig	
	Actual (1)	Adjusted (2)	Actual (3)	Adjusted (4)	Actual (5)	Adjusted (6)
Elementary	115.8	116.2	99.3	74.4	104.0	86.7
Junior	103.4	104.1	69.9	70.0	76.7	72.4
High	92.2	93.4	75.2	84.8	64.1	68.5
University	89.3	86.8	83.7	85.5	69.1	69.0
M.A.	76.0	74.1	81.1	76.2	68.8	68.7
Total	85.9 (n=351)	87.2	77.8 (n=563)	86.1	70.6 (n=2357)	69.2

Note: The "adjusted" is standardized on the British-Canadians age groups.

By Occupation (Actual)

	Native-born (1)	Child Immig (2)	Adult Immig (3)
Skill I	146.8	92.2	87.0
Skill II	98.1	85.2	77.9
Skill III	87.2	77.4	74.2
Skill IV	73.7	72.2	65.3
Total	87.3 (n=324)	79.1 (n=430)	75.03 (n=2220)

Table 4-4 Chinese Children-ever-born (CEB) by Education aged 20-49
(per married woman)

Education	Native-Born		Child Immigrants		Adult Immigrants	
	CEB (1)	% of British (2)	CEB (3)	% of British (4)	CEB (5)	% of British (6)
Elementary			3.2857	219.0	2.3766	158.4
Junior High	3.0	115.5	2.1071	81.2	2.3093	88.9
High School	1.5595	81.3	1.6636	86.8	1.7717	92.4
University	1.2465	76.4	1.3212	81.0	1.4551	89.2
M.A.+	0.7586	48.6	0.8065	51.7	1.3097	84.2
Total	1.3074 (n=354)	71.0	1.4765 (n=451)	80.2	1.693 (n=1870)	92.0

Table 4-5 Adjusted Chinese Children-ever-born by Education aged 20-49
Standardized on British Age Group
(per woman)

Education	Native-born		Child Immigrants		Adult Immigrants	
	CEB	% of British	CEB	% of British	CEB	% of British
Elementary			3.2857	219.0	2.3766	158.4
Junior High	3.2	116.6	2.7275	105.0	2.6797	103.2
High School	1.6739	87.3	2.1306	111.1	1.7055	89.0
University	1.3420	82.3	1.5403	94.4	1.3457	82.5
M.A. +	0.7924	50.8	1.0443	66.9	1.2973	83.2
Total	1.5119	82.1	1.9359	105.1	1.6600	90.2

Table 4-6

Chinese Children-ever-born (CEB) by Age Group
(per 1000 married women)

Age	Native-born		Child Immigrants		Adult Immigrants	
	CEB (1)	% of British (2)	CEB (3)	% of British (4)	CEB (5)	% of British (6)
20-24	500.0	94.0	565.2	106.2	323.0	60.7
25-29	693.5	58.0	925.7	77.5	678.4	64.0
30-34	1113.6	62.2	1476.6	82.5	1313.0	73.4
35-39	1693.9	82.6	1961.9	95.9	1815.0	88.9
40-44	2259.3	108.3	2253.7	108.0	2094.0	100.3
45-49	2142.9	91.0	2750.0	116.8	2464.0	104.6
Total	1307.4	71.0	1476.5	80.2	1693.0	92.0

Table 4-7

Chinese Adult Immigrant Fertility (CEB)
at the Age Group between 45 and 49
(per woman)

Time Entering Canada	Age at Immigration	Fertility	SD
1966-1970	20-29	2.5361	1.1421
1971-1980	30-39	2.6207	1.1052
1981-1985	40-44	2.5517	1.5311
1986-1991	45-49	2.6163	1.2233

Table 4-8

OLS Regression on Children-ever-born

	B	Beta	sig T
AGE	0.076740	0.4250	0.0000
EDU	-0.059120	-0.2130	0.0000
EMP	-0.199000	-0.0730	0.0000
FPT	-0.095390	-0.0380	0.0600
OCC1	-0.085450	-0.0280	0.1420
OCC3	-0.106000	-0.0420	0.0190
WAGE	-0.000005	-0.0670	0.0010
IMM	0.016170	0.1080	0.0000
Constant	-0.157836		0.2140

Multiple R	0.545
R square	0.297

signif F = 0.0000

Note: Please see Appendix A-3 for correlation matrix.

Table 5-1

Fertility Patterns
(CEB by per 1000 Women at All Marital Status)

Age Group	British (1)	Hong Kong (2)	Taiwan (3)	Mainland China (4)	Chinese Parents (5)
20-24	280.9	230.0	550.0	539.4	916.9
25-29	847.3	780.0	1460.0	1479.2	1926.8
30-34	1492.8	1439.0	2105.0	2003.7	2575.0
35-39	1786.5	1909.5	2570.0	2475.5	3500.0
40-44	1906.9	2951.2	2935.0	3212.2	3149.0
45-49	2217.5	3436.8	3495.0	4003.1	3000.0
Actual Total	1417.6	1564.6	1976.9	1947.8	2337.5
Adjusted Total	1417.6	1564.6	2032.1	2075.2	2435.2

Sources: The PUST of the 1971 and 1991 Canada censuses; Hong Kong census 1991, Main Report; Statistical Yearbook of the Republic of China, 1992; China census, 1990.

Note: The "adjusted total" is standardized on Hong Kong age group.

Table 5-2

Children-ever-born by Chinese Women aged 20-49 (All Marital Status) (per 1000 women)

Age Group	Immigrants from Sending Countries Hong Kong (1)	Taiwan (2)	Mainland China (3)
20-24	38.3	88.9	195.1
25-29	357.4	400.0	655.8
30-34	936.1	1093.2	1258.4
35-39	1503.8	1648.6	1682.1
40-44	1742.2	1979.5	1979.2
45-49	2000.0	2175.8	2445.5
Adjusted Total	1021.5	1154.3	1278.0

Source: The PUST of the 1991 Canada census.

Table 5-3
OLS Model on Chinese Children-ever-born

Variable	B	Beta	sig T
Native-born			
BFP	0.3410	0.0870	0.2220
EDU	-0.0530	-0.1940	0.0022
EMP	-0.0720	-0.0190	0.5550
FPT	-0.0660	-0.0230	0.3000
CFP	0.3740	0.2830	0.0000
WAGE	-0.000003	-0.0340	0.1430
WEEKS	-0.0024	-0.0350	0.5410
Multiple R = 0.562			
R^2 = 0.316			
sig F = 0.0			
Child Immigrants			
BFP	0.5460	0.2410	0.1430
EDU	-0.0940	-0.3200	0.0000
EMP	-0.0740	-0.0170	0.6410
FPT	-0.3330	-0.1150	0.0040
WAGE	-0.0000069	-0.0930	0.1430
WEEKS	-0.00071	-0.0100	0.8250
CFP	0.3170	0.2480	0.0010
PFP	0.1230	0.0840	0.2420
Multiple R = 0.647			
R^2 = 0.418			
sig F = 0.0			
Adult Immigrants			
BFP	0.00011	0.1030	0.0139
FPT	-0.4840	-0.1850	0.0060
CFP	0.7630	0.4690	0.0000
EDU	-0.0670	-0.1810	0.0000
WAGE	-0.0000088	-0.1350	0.0480
WEEKS	0.0030	-0.0410	0.1380
EMP	-0.1910	-0.0350	0.3410
Multiple R = 0.520			
R^2 = 0.270			
sig F = 0.0			

Table 6-1

Results of Multilevel Cross-Classified Model

Variables	**Model Equations**	
	6.4	**6.6**
Fixed Part		
Individual level (level I)		
Constant	-0.02463	0.5318
AGE	0.05471	0.0510
WAGE	-0.00001	-0.0000039
EMP	-0.04918	-0.2319
WEEKS	-0.00001*	0.0002879
IMM	0.024161	0.01689
BFP	0.026897*	0.01722
EDU	-0.066489	-0.05827
FPT	-0.062109	-0.09102
IMM^2	0.007343	
Class and Group Level (level II)		
RES	0.011406	0.003969
CFP	0.057344	0.142938
Interaction Term		
CFPRES	0.000623*	
CFPIMM	-0.003386	
Random Part		
Level I		
σ^2_{ξ}	0.9937	0.9741
Level II		
$\sigma^2_{\upsilon j}$	0.01105	0.01589
$\sigma^2_{\upsilon k}$	0.00209	0.00675
Deviance	8394.1	8218
χ^2	0	0

Note: Variables, except for these with *, are statistically significant at the level of 0.05. Please see Appendix A-5 for Standard Errors.

Table 6-2

Partial Derivative of the Normative Effects on Children-Ever-Born, Conditional on RES and IMM

	Assimilation Levels (Immigration Years)		
	1 Year	10 Years	20 Years
RES=104	0.119	0.088	0.054
RES=76.7	0.102	0.071	0.037
RES=64.1	0.094	0.063	0.030
RES=69.1	0.097	0.067	0.033
RES=68.8	0.096	0.066	0.032

Table 7-1

OLS Regression on CEB to the Chinese women aged 20-49 in Canada

	(1)		(2)		(3)		(4)		(5)		(6)	
Variable	B	sig T	B	sig T	B	sig T	B	sig T	B	sig T	B	sig T
ADULTG	0.35927	0	0.05897	0	-0.06115	0.3598	0.28547	0.0716	0.28592	0.0712	0.79044	0.002
CHILDG	0.16908	0.0596	0.24678	0.0019	0.17486	0.2223	0.41847	0.0	0.41950	0.0009	0.60313	0.0
AGE			0.08877	0.0	0.08710	0.0	0.08223	0.0	0.08229	0.0	0.09136	0.0
EDU					0.06616	0.0	-0.06656	0.0	-0.06656	0.0	-0.06073	0.0
IMM							0.00789	0.0159	0.00786	0.0164	0.01385	0.0
BFP									0.00001	0.6143	0.00005	0.5878
WAGE											-0.00001	0.0007
EMP											-0.18741	0.0004
FPT											-0.14525	0.0064
WEEKS											0.00005	0.9700
Constant	2.302326	0	-.62773	0	0.42917	0.0009	-.40336	0.0003	0.36399	0.0081	0.27396	0.0445
R^2	0.01064		0.23193		0.53590		0.53884		0.543420		0.555285	

Note: please see variance matrix in Appendix A-6.

Table 7-2

Results of RC Models
Chinese Wives aged 20-49

Variables	Model Equations	
	(7.2)	(7.3)
Fixed Part		
Individual Level		
Constant	-0.07672	-0.006901
ADULTG	0.5550	0.4514
CHILDG	0.0738	0.5862
AGE	0.05543	0.05701
EDU	-0.06007	-0.06038
IMM	0.01513	0.01433
BFP	0.38112*	0.42061*
WAGE	-0.00006	-0.00001
EMP	-0.18272	-0.17361
FPT	-0.12323	-0.10124
WEEKS	-0.00011*	-0.00121*
Class Level		
RES		0.00339
Random Part		
σ^2_ξ	0.6228	0.7064
σ^2_μ	0.2744	0.0891
Deviance	8777.1	8687.9
χ^2	3.7 e-8	2.6 e-5

Note: Variables, except for these with *, are statistically significant at the level of 0.05. Please see Appendix A-7 for Standard Errors.

Table 7-3
Two-Level Cross-Classified Models, Chinese Wives Aged 20-49

Variables	Model Equations	
	(7.4)	(7.5)
Fixed part		
Individual Level (Level I)		
Constant	0.02218	1.001109
ADULTG	0.5702	2.7585
CHILDG	0.7438	1.4542
AGE	0.05137	0.053936
EDU	-0.05686	-0.059571
IMM	0.0145	0.306297
BFP	0.3626*	0.233904*
WAGE	-0.0000052	-0.0000054
EMP	-0.1879	-0.191572
FPT	0.0000094*	-0.0000028*
Class Group Level (Level II)		
RES	0.001838	0.041486
CFP	0.07836	0.091477
Interaction Term		
RCI		0.0007783
RESIMM		-0.003643
CFPIMM		-0.067943
ADURES		-0.035434
ADUCFP		0.042537*
ADURESCFP		0.000996*
CHIRES		-0.016243*
CHICFP		-0.02356 *
CHIRESCFP		0.00237 *
Random Part		
Level I		
σ^2_{ς}	0.9514	0.9441
Level II		
σ^2_{υ}	0.009887	0.004695
Deviance	8787.5	8689.3
χ^2	3.9 e-5	0

Notes: Variables, except for these with *, are statistically significant at the level of 0.05. Please see Appendix A-8 for Standard Errors.

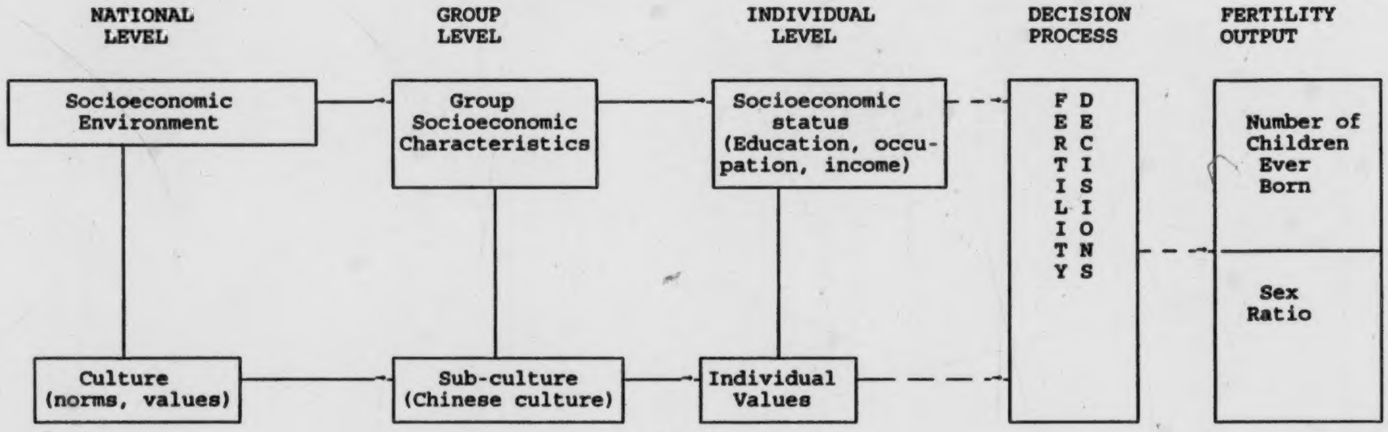
Table 7-4

Immigrant Contrast Conditional On RES and CFP

RES(%)	CFP Hong Kong (CFP=1.565)	 Taiwan (CFP=2.032)	 Mainland China (CFP=2.075)
Adult Immigrants			
Elementary (RES=104)	-0.703	-0.649	-0.629
Junior High (RES=76.7)	0.223	0.278	0.283
High School (RES=64.1)	0.651	0.699	0.704
University (RES=69.1)	0.481	0.532	0.537
M.A.+ (RES=68.8)	0.491	0.542	0.547
Child Immigrants			
Elementary (RES=99.3)	0.173	0.272	0.281
Junior High (RES=69.9)	0.541	0.608	0.614
High School (RES=75.0)	0.477	0.549	0.556
University (RES=83.7)	0.368	0.450	0.457
M.A.+ (RES=81.1)	0.400	0.479	0.487

Figure 2.1

THEORETICAL MODEL of CHINESE FERTILITY BEHAVIOUR

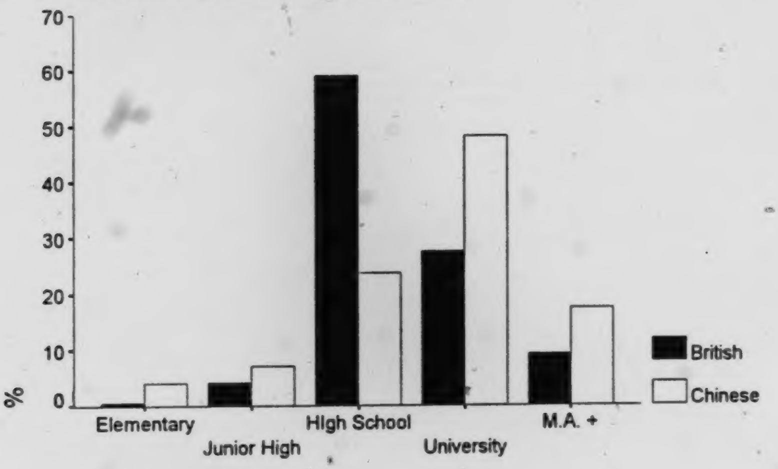

NATIONAL LEVEL
GROUP LEVEL
INDIVIDUAL LEVEL
DECISION PROCESS
FERTILITY OUTPUT
Socioeconomic Environment
Group Socioeconomic Characteristics
Socioeconomic status (Education, occupation, income)
FERTILITY DECISIONS
Number of Children Ever Born
Sex Ratio
Culture (norms, values)
Sub-culture (Chinese culture)
Individual Values

Note: ——— Correlational Relations
- - - - - Causal Relations

Figure 3-1: Education

The British & Chinese in Canada

Married Males aged 17-51



Married Females aged 15-49

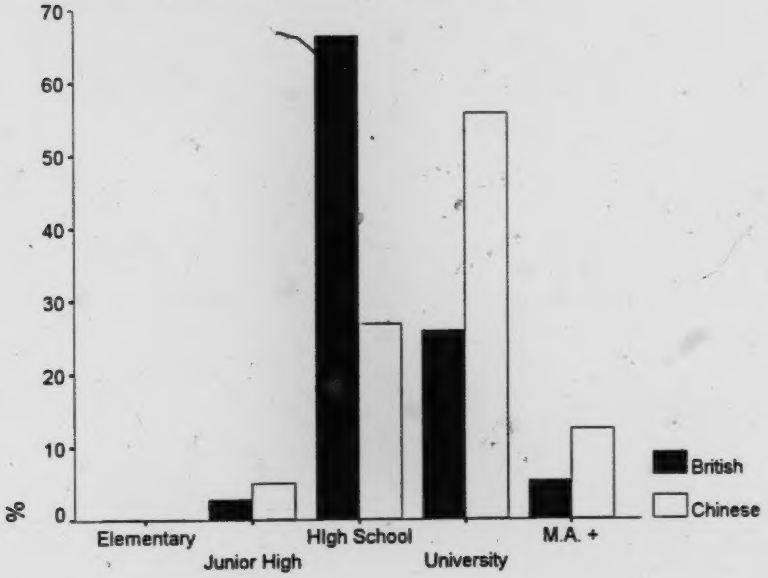
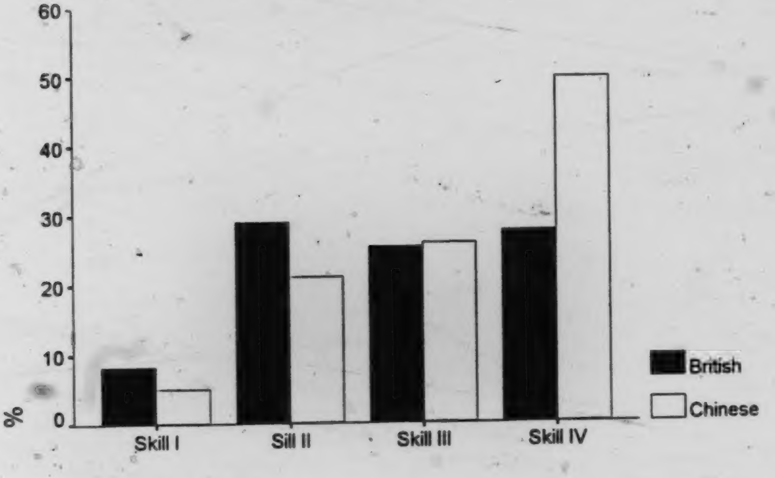


Figure 3-2: Occupation
The British & Chinese in Canada
Married Males aged 17-51



Married Females 15-49

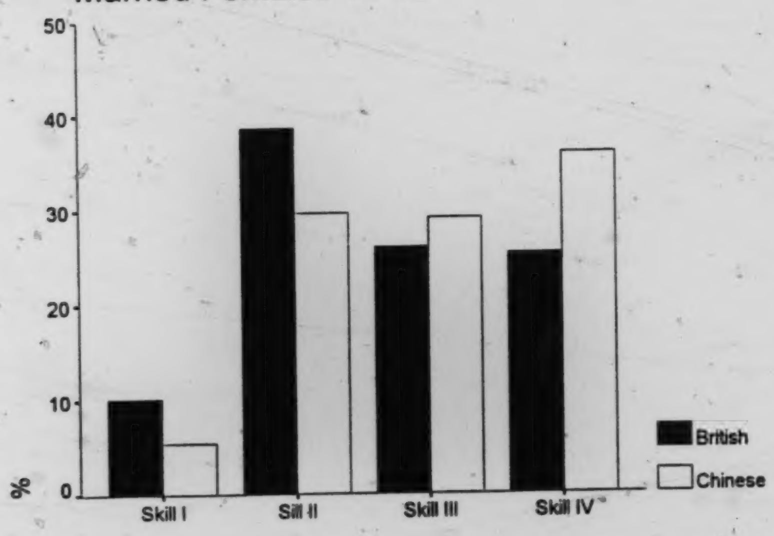


Figure 3-3: Native-Born Chinese Husbands' RES & Wives' Fertility

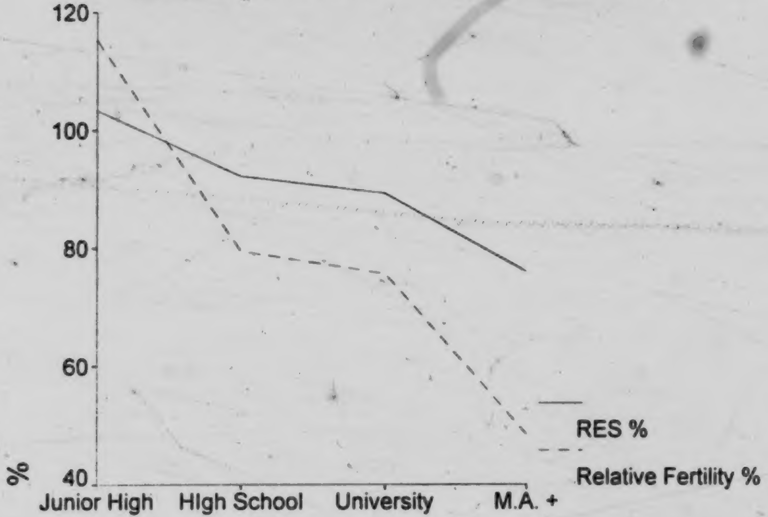


Figure 4.1 Child Immigrants
Husbands' RES & Wives' Fertility

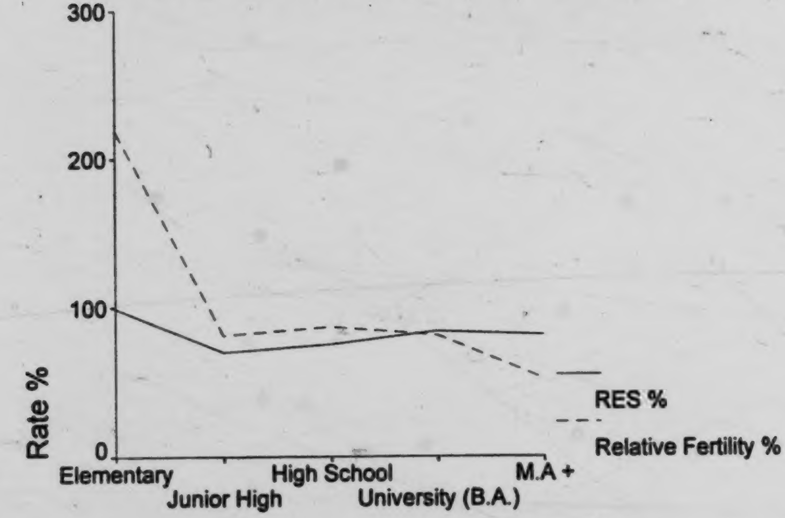
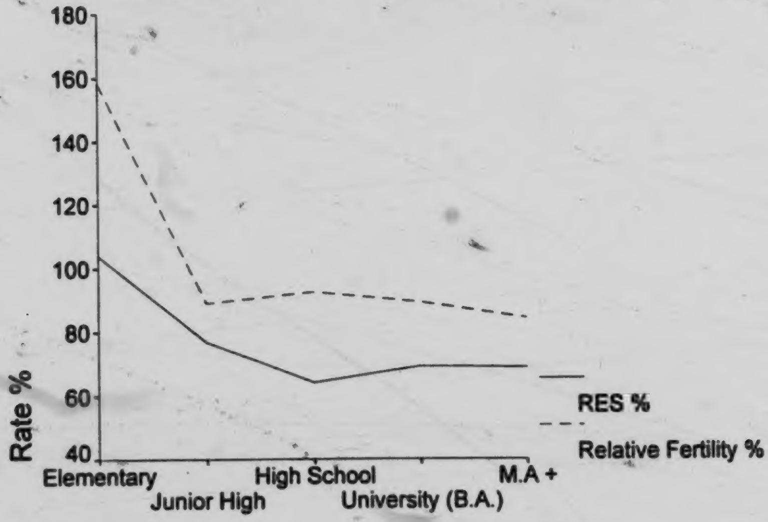


Figure 4.2 Adult Immigrants
Husbands' RES & Wives' Fertility



Bibliography

Arnold, F. and Z. Liu. (1986). "Sex Preference, Fertility, and Family Planning in China." Population and Development Review 12 (2):221-245.

Arnold, F. and E.C.Y.Kuo. (1984). "The Value of Daughters and Sons: A Comparative Study of the Gender Preference of Parents." Journal of Comparative Family Studies 15 (2):299-318.

Balakrishnan, T.R., J.F. Kantner and J.D. Allingham. (1975). Fertility and Family Planning in A Canadian Metropolis. Montreal: McGill-Queen's Press.

Banister, J. (1987). China's Changing Population. Stanford: Stanford University.

Basavarajappa, K.G. and S.S. Halli. (1984). "Ethnic Fertility Differences in Canada." 1926-71: An Examination of Assimilation Hypothesis, Journal of Biosociology Science 16:45-54.

Bean, F.D., H.L.Browing and W.P. Frisbie. (1984). "The Sociodemographic Characteristics of Mexican Immigrants Status Groups: Implications for Studying Undocumented Mexicans." International Migration Review 18 (3): 672-691.

Bean, E.D. and C.H. Wood. (1974). "Ethnic Variations in the Relationship between Income and Fertility", Demography 11:629-640

Becker, G.S. (1960). "An economic Analysis of fertility." In Demographic and Economic Change in Developed Countries. Universities-National Bureau Conference Series, No.11. Princeton, N.J.: Princeton University Press.

Blau, F.D.. (1992). "The Fertility of Immigrant Women: Evidence from High Fertility Source Countries." In Immigration and Workforce:Economic Consequences for the United States and source Areas. Eds G. Borjas and R.Freeman. Chicago:University of Chicago Press.

Bongarts, J.. (1978). "A Framework for Analyzing the Proximate Determinants of Fertility". Population and Development Review
4:105-132.

Borjas, G. (1985). "Assimilation, Changes in Cohort Quality, and the Earnings of Immigrants." Journal of Labour Economics 3:463-89.

Bouvier, L.F. (1982). The Future Racial Composition of the United States. Washington, DC: Population Reference Bureau.

Bulatao, R.A. and R.D.Lee. (1983). Determinants of Fertility in Developing Countries. New York: Academic Press.

Caldwell, J.C. (1987). "Toward a Restatement of Demographic Transition Theory." in Perspectives on Population, ed. by Menard, S. and E.W. Moen. Oxford: Oxford University Press.

Cheung, P.P.L. (1988). "Marriage Market, Timing, and Policy in Singapore", Paper presented at the Annual Meeting of the Population Association of America, 21-23 April, New Orleans.

Cho, L, F.Arnold, and T.H.Kwon. (1982). "The Determinants of Fertility in the Republic of Korea." Committee on Population and Demography. Report No.14. Washington, DC: National Academy Press.

Chui, T.W.L. and F. Trovato. (1989). "Ethnic Variations in Fertility: Microeconomic and Minority Group Status Effects." International Review of Modern Sociology Vol.19 (Spring):37-52.

Cleland, J., J. Verral, and M. Vaessen. (1983). "Preferences for the Sex of Children and Their Influence on Reproductive Behaviour." World Fertility Survey Comparative Studies, No.27. Voorburg, Netherlands: International Statistical Institute.

Coal, A.J. (1984). Rapid Population Change in China. 1952-82. Committee on Population and Demography. Report No.27. Washington, D.C.: National Academy Press.

Cochran, W.G. (1977). Sampling Techniques. New York: Wiley.

Coombs, L. and T.N. Sun. (1981). "Familiar Values in a Developing Society: A Decade of Change in Taiwan." Social Forces, 59 (4):1229-1255.

Cooney, R.S. and Jiali Li. (1994). "Household Registration Type and Compliance with the `One Child' Policy in China, 1979-1988." Demography, 31 (1):21-31.

Crool, E., D.Davin, and P.Kane. (1985). China's One-Child Family Policy. New York: St. Martain's Press.

Davis, K. and J.Blake, (1956). "An Analytical Framework." Economic Development and Cultural Change 4:211-235.

Day, L.H. (1968). "Natality and Ethnocentrism: Some Relationships Suggested by An Analysis of Catholic-Protestant Differentials." Population Studies 22:27-50.

Durkheim, E. (1897). Suicide. Translated by J.A. Spaading and G.Simpson. New York: The Free Press (1951).

Easterlin, R.A. (1969). "Towards a Socio-economic Theory of Fertility: A Survey of Recent Research on Economic Factors in America Fertility." In S.J. Behrman et al., eds., Fertility and Family Planning: A World View. Ann Arbor, Mich: University of Michegan Press.

Easterlin, R.A. (1975). "An Economic Framework for Fertility Analysis." Studies in Family Planning 6:54-63.

Easterlin, R.A. (1978). "The Economics and Sociology of Fertility: A Synthesis." pp.57-113 in C.Tilly, ed., Historical Studies of Changing Fertility. Princeton, N.J.: Princeton University Press.

Easterlin, R.A., R.A. Pollak, and M.L. Wachter. (1980). "Toward a More General Economic Model of Fertility Determination: Endogenous Preferences and Natural Fertility." pp.81-135 in R.A. Easterlin, ed., Population and Economic Change in Developing Countries.

Ebanks, G.E., P.M. George, and C.E. Nobbe. (1974). "Fertility and Number of Participants in Barbados." Population Studies 38(3):449-62.

Ebrey, P.B. (1991). Confucianism and Family Rituals In Imperial China. Princeton: Princeton University Press.

Feng, Y.L.. (1934). *Zhongguo zheyueshi* (A History of Chinese Philosophy). Shanghai: Commercial Press.

Fisbie, P.W. and D. Bean. (1978). "Some Issues in the Demographic Study of Racial and Ethnic Population." In Fisbie and Bean, eds., The Demography of Racial and Ethnic Groups. New York: Academic

Fishbein, Martin. (1972). "Toward an Understanding of Family Planing Behaviours." Journal of Applied Social Psychology 2-3:214-27.

Ford, K., (1990). "Duration of Residence in the United States and the Fertility of U.S. Immigrants." International Migration Review Vol.24, pp.34-36.
Press.

Freedman, R. (1986). "Policy Options after the Demographic Transition: The Case of Taiwan." Population and Development Review 12 (1):77-99.

Freedman, R. and L.C. Coombs. (1974). Cross-Cultural Comparisons: Data on Two Factors in Fertility Behaviour. Report of the Subcommittee on Comparative Fertility Analysis of the International Union for the Scientific Study of Population. New York: The Population Council.

Ge, M.R.. (1982). *Ge Muru quanji: Lishijuan (1)* (The Complete Works of Ge Muru: History, vol.1). Beijing: People's Publishing House.

Goldscheider, C. and P.H. Uhlenberg. (1969). "Minority-Group Status and Fertility." American Journal of Sociology 74:361-372.

Goldstein, S. and A. Goldstein. (1983). "Migration and Fertility in Peninsular Malaysia: An analysis Using Life History Data." Sants Monica:Rand Corporation Report No.N-1860-AID.

Goodkind, D.M. (1995). "The Significance of Demographic Triality: Minority Status and Zodiacal Fertility Timing Among Chinese Malaysians." Population Studies 49:45-55.

Gordon, M.M. (1964). Assimilation in America. New York: Oxford University Press.

Goldstein, S,. A.Goldstein and S.Piampiti. (1973). "The Effect of Broken Marriage on Fertility Levels in Thailand." Journal of Social Sciences (Thailand) 10:47-87.

Guark, D.T. (1980). "Assimilation and Fertility: A Comparison of Mexican American and Japanese American Women." Hispanic Journal of Behaviour Science 2: 219-239.

Halli, S.S.. (1987). How Minority Status Affects Fertility. Asian Groups in Canada. New York: Greenwood Press.

Harbison, S.F. and Marjorie.E. Weishaar. (1981). "Samoan Migrant Fertility: Adaptation and Selection." Human Organization 40:268-73.

Hendershot, G.E. (1976). "Social Class, Migration, and Fertility in the Philippines." In The Dynamics of Migration:Internal Migration and Migration and Fertility. Inter-disciplinary Communications Program, Occasional Monograph Series, Vol.1, Smithsonian Institution.

Henripin, J.. (1970). Trends and Factors of Fertility in Canada. Ottawa: Information Canada.

Hervitz, H.M. (1985). "The Effects of Migration on Fertility: The Case of Brazil." International Migration Review Vol.19, 2: 293-317.

Hong, Sawon. (1979). Community Development and Human Reproductive Behaviour. Seoul: Korean Development Institute.

Hox, J.J. (1994). "Hierarchical Regression Lodels for Interview and Respondent Effects", Sociological Methods and Research 22 (3) :300-318.

Hox, J.J and Ita de Kreft. (1994). "Multiple Analysis Methods", Sociological Methods and Research 22 (3): 283-299.

Huang, J.H. (1982). "*Xiandai shenhouzhong xiao de shijian*" (Filial Practice in Contemporary Life). In *Chuantong wenhua yu xiandai shenhuo yantaohui lunwenji* (A Conference on the Traditional Culture and Contemporary Life). Taibei: Committee of Reviving Chinese Traditional Culture, pp.285-300.

I Ching (The Book of Changes). Translated by Thomas Cleary. Bopston and London: Shambhala Publication, Inc..

Iversen, G.R. (1991). Contextual Analysis. SAGE Publications. London: The International Professional Publishers.

Jiobu, R. (1988). Ethnicity and Assimilation. New York: State University of New York Press.

Jiobu, R. and H. Marshall. (1977). "Minority Status and Family Size: A Comparison of Explanations." Population Studies 31:509-17.

Johnson, N.J. (1979). "Minority Group Status and the Fertility of Black Americans: A New Look." American Journal of Sociology 84:1386-1400.

Johnson, Nan E. and Suewen Lean. (1985) Relative Income, Race, and Fertility", Population Studies 39:99-112.

Johnson, N.J. and R.Nishida. (1980). "Minority Group Status and Fertility: A Study of Japanese and Chinese in Hawaii and California." American Journal of Sociology 86:496-511.

Kahn, J.R. (1988). "Immigrant Selectivity and Fertility Adaptation in the United States." Social Forces Vol.67, 1:108-128.

Kendall, P. and P.F. Lazarsfeld. (1950). "Problems of Survey Analysis." In R.K. Merton and P.F. Lazarsfeld, eds., Studies in the Scope and Method of the American Soldier. Glencoe: Free Press.

Kennendy, R.E. (1973). "Minority Group Status and Fertility: The Irish." American Sociological Review 38:85-96.

Kuo, E.C.Y. (1984). The Value of Daughters and Sons. Journal of Comparative Family Studies, 15 (2):299-318.

Kraft, Ita G.G and Jan de Leeuw. (1994) "The Gender Gap in Earnings: A Two-Way Nested Multiple Regression Analysis With Random Effects", Sociological Methods and Research 22 (3) : 319-341.

Lee, E. and A. Lee. (1959). "The Future of the American Nego." Social Forces 37 (March, 1959):228-231.

Leete. R. (1994). "The Continuing Flight From Marriage and Parenthood among the Overseas Chinese in East and Southeast Asia: Dimensions and Implications." Population and Development Review 20 (4):811-29.

Li, Peter S.. (1979). "An Historical Approach to Ethnic Stratification: The Case of Chinese in Canada, 1858-1930." Canadian Review of Sociology and Anthropology 16:320-32.

Linton, Raiph (ed.) (1945). The Science of Man in the World Crisis. New York: Columbia University Press.

Lopez, D.E. and G. Sabagh. (1978). "Untangling Structural and Normative Aspects of the Minority Status-Fertility Hypothesis." American Journal of Sociology 83 (6):1491-1497.

Lorimer, F.. (1958). Culture and Human Fertility. New York: Greenwood Press.

Mason, W.M., G.Y. Wong, and B.Entwisle. (1984). "Contextual Analysis Through The Multilevel Linear Model", Sociological Methodology 72-103

Massey, D.S. and B.P.Mullan. (1984). "A Demonstration of the Effect of Seasonal Migration on Fertility." Demography Vol.21, 4:501-517.

Mittelbach, F.G. and J.W.Moore. (1968). "Ethnic Endogamy-The Case of Mexican Americans." American Journal of Sociology 74:50-62.

Mincer, J. (1963). "Market Prices, Opportunity Costs and Income Effects." In C.Christ et al, eds., Measurement in Economics:Studies in Mathematical Economics in Memory of Yehuda Grunfeld. Stanford, Calif: Stanford University Press.

Petersen, W.. (1975). Population. New York: Macmillan.

Przeworski, A. and G.A.D. Soares. (1971). "Theories in Search of A Cure: A Contextual Interpretation of Left Vote." American Political Science Review 65:51-68.

Rindfuss, R.R.. (1976). "Fertility and Migration: The Case of Puerto Rico." International Migration Review 10 (2):191-203.

Ritchey, P.N. (1975). "The Effect of Minority Group Status on Fertility: A Re-examination of Concepts." Population Studies 29:249-57.

Rogers, E.M. (1995). Diffusion of Innovations, 4th ed. New York: THe Free Press.

Rosenwaike, I. (1973). "Two Generation Italian in America: Their Fertility Experience." International Migration Review 7 (3):271-80.
Ryder, N.B. (1973). "A Critique of the National Fertility Study." Demography 10:495-506.

Ryder, N.B. (1973). "A Critique of the National Fertility Study." Demography 10:495-506.

Schemerhorn, R.A. (1970). Comparative Ethnic Relations: A Framework for Theory and Research. New York: Random House.

Scheuch, E.K. (1969). "Social Context and Individual Behaviour." In M.Dogan and S. Rokkan, eds., Quantitative Ecological Analysis in the Social Science. Cambridge: MIT Press.

Schoen, R. and L.E. Cohen. (1980). "Ethnic Endogamy among Mexican American Grooms: A Reanalysis of Generational and Occupational Effects." American Journal of Sociology 86: 359-366.

Schwartz, B. (1985). The World of Thought in Ancient China. Cambridge: Harward University Press.

Sharma, R.D.. (1980). The University of Alberta: Migration and Fertility in A Western Canadian Metropolis. Unpublished Dissertation in the University of Alberta.

Sly, D.F. (1970). "Minority Group Status and Fertility: An Extension of Golscheider and Uhlenberg." American Journal of Sociology 76:443-59.

Soothill, W.E.. (1951). The Three Religions of China. Geoffrey Cambridge: Oxford University Press.

Stacey, J. (1983). Patriarchy and Socialist Revolution in China. Berkely: University of California Press.

Stephen, E.H. and F.D.Bean. (1990). "Assimilation, Disruption and the Fertility of Mexican Origin Women In the United States." Discussion Paper No.3, Population Studies Centre, The Urban Institute.

Stephen, E.H. (1992). "Assimilation, Disruption and the Fertility of Mexican-Origin Women in the United States." International Migration Review Vol.26, No.1, pp.67-87.

Swicegood, C.G., F.D. Bean, E.H. Stephen, W. Opitz, and G.Cardenas. (1986). "Language Usage and Fertility in the Mexican-Origin Population." Paper presented at the annual meetings of the Population Association of America.

Tang, Z.L. (1995). "Confucianism, Chinese Culture and Reproductive Behaviour." Population Environment 16 (3):269-84.

Trovato, F. (1981). "Canadian Ethnic Fertility." Sociological Focus Vol.14, 1:57-75.

Trovato, F. and T.K. Burch. (1982). "Minority Group Status and Fertility in Canada." Canadian Ethnic Studies 12 (3):1-18.

Trovato, F.. (1987). "Rural-Urban Migration and Fertility in Costa Rica." International Review of Modern Sociology 17 (Autumn):257-72.

United Nations Subcommission on Prevention and Protection of Minorities (1952). Yearbook of Human Rights for 1950. New York: United Nations.

Van den Eeden, P. and H.J.M. Huttner. (1982). "Multi-level Research." Current Sociology 30 (3).

Verma, R.B.P. (1980). "Variations in Family Size Among Canadian Women by Generation and Ethnic Group." International Journal of Comparative Sociology xx (3-4):293-303.

Visaria, P., (1969). "Urbanization, Migration, and Fertility in India." In The Family in Transition, Fogarty International Centre Proceedings No.3. Washington, DC. pp.257-283.

Williams, Robin M., Jr. (1947). The Reduction of Intergroup Tensions. New York: Social Science Research Council.

Williamson, N.E. (1976). Sons and Daughters. London: Sage Publications.

Willis, R.J. (1973). "Economic Theory of Fertility Behaviour." pp. 25-75, in T.W.Schultz, ed., Economics of the Fertility: Marriage, Children and Human. Chicago: University of Chicago Press.

Woodhouse, G., J. Rasbash, H. Goldstein, and Min Yang. (1995). Guide to MLn for New Users. London:Institute of Education, University of London.

Zhou, Y.T. (1981). *Xiao yu zhongguo wenhua* (Filial Piety and Chinese Culture). Shanghai: Shanghai People's Publishing House.

Appendix

Appendix A Output of SPSS and MLn

A-1

Correlation Matrix for Table 3-5

	Wage	Age	EMP	EDU	WEEKS
Wage	1.000	.000	-.043	-.141	-.440
Age	.000	1.000	-.037	.115	-.039
EMP	-.043	-.037	1.000	-.125	-.171
EDU	-.141	.115	-.125	1.000	-.011
WEEks	-.440	-.039	-.171	-.001	1.000

A-2

Standard Errors for Table 3-6

Variables	Model Equation		
	(3.2)	(3.3)	(2.6)
Fixed Part			
Individual Level			
Constant	.407900	.281800	.414200
AGE	.008483	.008672	.008871
WEEKS	.002869	.002835	.012720
INCOME	.000018	.000028	.000027
EDU	.017780	.041560	.050520
Class Level			
RES		.021090	.008688
Interaction Term			
WEEKRES			.001385
Random Part			
σ^2_e	.08207	.08302	.08156
σ^2_u	.07283	.07302	.07280

A-3

Correlation Matrix able 4-8

	IMM	OCC3	EDU	FPT	Age	OCC2	EMP	Wage	OCC1
IMM	1.000	-.058	.003	.049	-.283	-.055	-.017	-.213	-.050
OCC3	-.058	1.000	-.107	-.290	.072	.620	-.322	-.-14	.590
EDU	.003	-.107	1.000	.148	.061	-.182	.041	-.175	-.302
FPT	.049	-.290	.148	1.000	.033	-.218	-.264	-.330	-.193
Age	-.283	.072	.061	.033	1.000	.049	-.018	-.032	.023
OCC2	-.055	.620	-.182	-.218	.049	1.000	-.285	-.084	.573
EMP	-.017	-.322	.041	-.264	-.018	-.285	1.000	-.154	-.235
Wage	-.213	-.014	-.175	-.330	-.032	-.084	-.154	1.000	-.201
OCC1	-.050	.590	-.302	-.193	.023	.573	-.235	-.201	1.000

A-4

Correlation Matrix for Table 5-3

	WEEKS	Age	BFP	EDU	EMP	FPT	Wage	CFP
WEEKS	1.000	-.103	-.047	-.043	-.147	-.293	-.316	.080
Age	-.103	1.000	-.043	.162	.007	.139	.085	-.741
BFP	-.047	-.043	1.000	-.022	-.-14	-.040	.051	.141
EDU	-.043	.162	-.022	1.000	-.119	.030	-.009	-.138
EMP	-.147	.007	-.014	-.119	1.000	-.060	-.015	-.045
FPT	-.295	.139	-.040	.030	-.060	1.000	-.029	-.083
Wage	-.316	.085	.051	-.099	-.015	-.290	1.000	-.152
CFP	.080	-.741	.141	-.138	-.045	-.083	-.152	1.000

A-5

Standard Errors for Table 6-1

Variable	Model Equation	
	6.4	6.6
Fixed Part		
Individual level (level I)		
Constant	.0087510	.12753
AGE	.0075340	.004852
WAGE	.0000035	.0000011
EMP	.0134710	.0753400
WEEKS	.0001304	.0001273
IMM	.0031750	.003285
BFP	.0291520	.079425
EDU	.0050690	.005964
FPT	.0213910	.037531
IMM^2	.0015470	
Class and Group Level (level II)		
RES	.0049810	.0011281
CFP	.0135720	.0535411
Interaction Term		
CFPRES	.0008931	
CFPIMM	.0007532	
Random Part		
Level I		
σ^2_{ϵ}	.023970	.018350
Level II		
σ^2_{uj}	.004790	.003261
σ^2_{uk}	.000683	.000497

A-6

Correlation Matrix for Table 7-1

	WEEKS	BFP	CHIGROUP	EDU	EMP	IMM	Age	FPT	Wage	ADUGROUP
WEEKS	1.000	-.017	-.094	.023	-.160	-.110	-.063	-.343	-.330	-.093
BFP	-.017	1.000	.018	-.007	-.003	-.019	.035	-.009	.023	.007
CHIGROUP	-.094	.018	1.000	.041	-.003	.809	-.391	.038	-.106	.920
EDU	.023	-.007	.041	1.000	.015	.014	.035	.129	-.284	.049
EMP	-.160	-.003	-.003	.015	1.000	-.022	-.024	.020	-.080	.000
IMM	-.110	-.019	.809	.014	-.022	1.000	-.506	.062	-.154	.905
Age	-.063	.035	-.391	.035	-.024	-.506	1.000	.045	-.002	-.532
FPT	-.343	-.009	.038	.129	.020	.062	.045	1.000	-.204	.031
Wage	-.300	.023	-.106	-.284	-.080	-.154	-.002	-.204	1.000	-.092
ADUGROUP	-.093	.007	.920	.049	.000	.905	-.532	.031	-.092	1.000

A-7

Standard Errors for Table 7-2

Variables	Model Equation	
	(7.2)	(7.3)
Fixed Part		
Individual Level		
Constant	.02357	.003245
ADULTG	.25127	.213470
CHILDG	.03532	.224830
AGE	.00126	.001321
EDU	.00875	.008931
IMM	.00386	.003314
BFP	.54683	.654834
WAGE	.00002	.000003
EMP	.08673	.080257
FPT	.05749	.043821
WEEKS	.00017	.001936
Class Level		
RES		.000143
Random Part		
σ^2_ε	.0014	.00232
σ^2_μ	.0133	.00351
Deviance		
χ^2	3.7e-18	2.6 e-15

Standard Errors for Table 7-3

Variables	Equations	
	(7.4)	(7.5)
Fixed part		
Individual Level (Level I)		
Constant	.00823	.36821
ADULTG	.23113	.88645
CHILDG	.32466	.65763
AGE	.00335	.00231
EDU	.00425	.00536
IMM	.00433	.06325
BFP	.54623	.43672
WAGE	.000002	.000002
EMP	.07683	.08124
FPT	.000011	.0000029
Class Group Level (Level II)		
RES	.000768	.01035
CFP	.021164	.03004
Interaction Term		
RCI		.000215
RESIMM		.001135
CFPIMM		.024513
A1DURES		.007426
ADUCFP		.051362
ADURESCFP		.001137
CHIRES		.023699
CHICFP		.024334
CHIRESCFP		.003025
Random Part		
Level I		
$\sigma^2\varsigma$	.002541	.001582
Level II		
σ^2_u	.000113	.000064

Appendix B

Multilevel Modelling Program

Currently, there are four specialized programs available to analyze random coefficient regression models: HLM (Bryk, Raudenbush, Seltzer, and Congdon 1988), GENMOD (Mason, Anderson, and Hayat 1988), VARCL (Longford 1990), and MLn (Prosser, Rasbash, and Goldstein). There are some differences between the models that can be fitted by the programs, but the various approaches have much in common and generally lead to the same conclusion. All programs use maximum likelihood estimation to decompose the variance. Asymptotic standard errors are available for the estimated parameters, which can be used for hypothesis testing. All programs allow to fix the variance of a specific regression slope at zero, which assumes that this slope is fixed. In addition, a deviance can be calculated from the value of the likelihood function, which can be used to test the difference in fit between two models, in a manner analogous to the chi-square test between two nested covariance structure models. This likelihood ratio test is especially useful for testing differences in the random structure of the model that are the result of fixing certain regression slopes across groups (Hox and Kraft 1993).

Mln, which is employed in this thesis, is a software program developed by Institute of Education, University of London. This program uses iterative generalized least squares (IGLS), which views the likelihood function as depending on two sets of parameters: the fixed regression coefficients and the variance components. If the variance components were known, the regression coefficients could be estimated easily by weighted least squares. If the regression coefficients were known, the variance components can be estimated fairly simply as well. IGLS alternates these two minimization iteratively. With MLn, analysts have to use a macro to calculate the nonlinear transformation function and control the iterations. This makes MLn more flexible and more complicated than VARCL.

MLn is a command-driven program. Data are held by MLn in columns of a worksheet. By default the program allocates 400 columns, 75 fixed and 75 random parameters and 5 levels of nesting. The worksheet dimensions, the number of parameters and the number of levels can be allocated dynamically.